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Brakes on Productivity

A STATEMENT issued on Monday by the Federation of British Industries and the National Union of Manufacturers has expressed with the authority of these two organisations—representing virtually the whole of productive industry—the misgivings regarding the national approach to the economic position that have been voiced by individuals at numerous company meetings. Basing the argument on the need to meet increasingly formidable competition, the statement emphasises industry's need of capital for a more rapid programme of development and re-equipment. Insufficient progress in this direction, particularly among smaller firms, has been due to taxation eating into profits to an extent that has left industry insufficient funds to maintain even the existing scale of operations. Private savings have been similarly curtailed, so that a customary source of capital has been much reduced in volume. These arguments, plus the personal factor of a lack of material inducement among all engaged in industry, from higher management to manual worker, are put forward to support the contention that a continuance of this state of affairs will lead to an inevitable fall in the productive efficiency, the competitive ability and, ultimately, the output of British industry. The statement does not propose specific methods of reducing taxation by making cuts in Government expenditure, but it asserts with full responsibility that a permanent increase in overall production and in exports will not be achieved until taxation has been materially reduced. A point of importance is made when it is asserted that a reduction in public spending represents the price that must be paid by the community for ultimate protection of the real standard of living. Industry in general, including the transport industry on which all the others depend, is only too conscious of the effects of restrictions on capital investment. The need now is for all engaged in industry to be aware that any reliefs in taxation that may be granted might well have to be accompanied by some drawbacks in other directions, and that the way to better personal standards of living will be by exploiting to the full the added productive capacity that capital can provide, not by regarding it as a form of largesse.

European Passenger Transport

THE many contrasts between transport trends in Britain and some Continental countries apparent in the Economic Commission for Europe *Bulletin of Transport Statistics* for 1951, which appeared earlier this week, include that in passenger travel. Whilst railway passenger traffic in Western Europe on the whole was a little higher than in 1938, despite increases in air and in most forms of road transport, the number of railway journeys per head of the population declined as between 1938 and 1951 only in Britain and Western Germany. In the United Kingdom it fell from 27 to 20, but only slightly in Germany. The cause seems to be the immense development since 1938 of public road passenger transport. The number of inhabitants per bus or motorcoach in Britain was 656 in 1951, the lowest in Europe, compared with 919 in 1938; the corresponding figures for Western Germany are 2,970 and 3,461. Neither Britain nor Germany shows the steepest rise in the number of public service road vehicles. The country second to Britain in the ratio of inhabitants to buses is Norway, with 824, where travel over the relatively few railways seems to have declined between 1938 and 1951 roughly in inverse ratio to the number of buses. The conditions governing passenger transport, however, differ widely in Britain, Western Germany, and almost every European country.

Steel Production

THE rate of 16,314,000 ingot tons a year achieved in British production of steel last December is a record for the month that includes the Christmas holiday, and compares with the rate of 14,953,000 tons in December, 1951. This means that the last four months of last year each established record levels for the respective months. It augurs well moreover for the current year. The December issue of the *Monthly Statistical Bulletin* of the British Iron & Steel Federation estimates that the objective of 17,500,000 tons, which the industry has set itself for 1953, will be reached, compared with the record totals of 16,293,000 tons for 1950 and 16,418,000 tons for 1952. The additional steel available presumably will be in full demand for additional export orders envisaged by the Chancellor of the Exchequer, which will more than offset the diminution in demand for defence purposes; it is not known what increases are expected by the Board of Trade for the railway material export industries. The most important use of steel in terms of tonnage is for capital investment at home. Important capital works on British Railways are being restricted by both the steel shortage and the ban on capital investment.

Mr. Robert Beavan

GREAT regret will be felt in signalling circles, on the railway and in industry, at the death, so regrettably soon after retirement, recorded on another page, of Mr. Robert Beavan who for many years served in, and later was in charge of, the London office of the Railway Signal Co. Ltd., of Liverpool. He had been connected with

the undertaking for over 50 years. During that time he had seen many large contracts carried out, not only in the British Isles but in many parts of the world, especially in South America. The resignalling of the former London, Tilbury & Southend line on the occasion of the Bow-Barking widening was one of the most extensive mechanical signalling works ever undertaken. Although having little if anything to do with power signalling, Mr. Beavan's time with his company saw a wide application of the electric train staff in many countries, and the development of hand generator equipment, with other apparatus, including Stockdale's single-line non-token block adopted in Mauritius. His sound knowledge and experience and invariably kindly manner made him much respected in the railway and consulting engineering worlds. At the meetings of the Institution of Railway Signal Engineers he was a familiar figure, where his genial presence will be greatly missed.

British Transport Commission Statistics

MORE detailed information might well be given in the B.T.C. four-weekly *Transport Statistics* on some of the Commission's ancillary activities. Receipts from British Railways marine services for instance are shown under passengers; merchandise, mails, and parcels; and livestock. The various services differ widely; and it would be helpful to show receipts under the services or groups of services from which derived, such as North Sea (roughly ex L.N.E.R.), Channel (roughly ex S.R. with ex G.W.R. Channel Islands), Anglo-Irish, Clyde Coast, and miscellaneous, or in some other grouping which takes account of traffic routes and of British Railways marine or Regional organisation. The reduction in ship receipts for Period 12 of last year compared with that of 1951 under all the three heads shown allows only of a guess at the causes—the £25 foreign travel allowance, perhaps, with increased air competition affecting Irish traffic also; but as the geographical sources of traffic are not shown, there might have been a drop in Clyde steamer receipts as well. Some operating statistics of ships would be welcome, also trend figures. The rates and fares by marine and especially Continental services probably are too complicated to permit remarks on the strict comparability of receipts with those of previous years.

Overseas Railway Traffics

THE factors vitiating comparison of the receipts of South and Central American railways with those of the preceding year, such as rate increases, labour troubles, floods, and the generally fluctuating nature of freight traffic, have been increased by alterations in the rate of currency conversion. Antofagasta (Chili) & Bolivia receipts for the week ended January 9 last are shown as £79,447, those for the first week of 1952 as £105,500; but whilst the conversion rate of the boliviano remained at 169·61 to the £, that of the Chilean peso was taken at 350·40 for 1953 and 230·60 for last year, these being average remitting rates adopted by the company as more in accordance with realities than the bookkeeping rate of 78 previously used for the Chilean Section traffics. Peruvian Corporation traffic receipts for December, 1952, were 9,266,000 soles from its Peruvian, and 21,542,000 bolivianos from its Bolivian undertakings, against 8,471,000 soles and 19,282,000 bolivianos in 1951; aggregates for the six months to December 31 were 55,525,000 soles and 103,832,000 bolivianos compared with 49,271,000 and 95,087,000 in 1951. The official remittance rates of 42/43 and 169·61 were used in all cases. No explanation is yet available of the absolute increase in receipts.

Cross-Channel Car Ferry Charges

TRAVELLERS to the Continent who take their cars with them are being offered reduced charges in April by an air ferry company specialising in this work. In this case, however, the cost to the traveller will still be substantially above that for surface transport, unlike the passenger air travel fares scheduled for the same month to which we refer in an article on page 87. Although large percentage reductions are being made by the air ferry, the result will hardly justify the comment made recently in *The Daily Telegraph* that motorists taking their cars abroad will hope that "British Railways will learn something from Silver City Airways, whose cross-Channel ferry charges have just been cut by as much as 53 per cent for cars and 75 per cent for motorcycles and cycles." Nevertheless, the rate for a Morris "Minor" or similar small wheelbase car will still be £7 10s. against £5 on the Southern Region Dover/Folkestone-Boulogne route. For a car such as an Austin "A.90" the air rate at £15 will be three times the surface charge, which for cars up to the size and weight of the Ford "Consul" remains the same as for the Morris "Minor."

Moving an 800-ton Bridge on the Santa Fe

RECORD floods in Kansas and Missouri in July, 1951, endangered the bridge carrying the Ottawa Junction-Emporia section of the Atchison, Topeka & Santa Fe Railway over the Neosho River, near Emporia, about 100 miles south-west of Kansas City. The bridge was built as a single-line structure in 1887 and widened to carry a second track in 1905. Hitherto it has consisted of a single 220-ft. through-truss span with ballasted deck, and the swing of the river eastwards threatened the east abutment. It was therefore decided to move this 800-ton span 50 ft. eastwards, and increase the waterway by providing five new 50-ft. approach spans, four to the east and one to the west of the main span, thus providing ample spill waterway during floods. The work, which was carefully planned and executed, is described in an article in this issue.

A Driver's Curious Assumption

THE accident at Clydebank on January 21, 1952, was marked by a curious assumption on the part of the driver of the colliding train. His fireman had noticed the green hand lamp of a fogman—the only one on duty in the vicinity—actually acting for a signal for the other line; the driver, informed that such a lamp had been seen, assumed contrary to rules he was well acquainted with, that he was to pass the home signal at danger. As will be seen from Colonel R. J. Walker's report on the case, summarised in this issue, the signalman had acted carelessly in accepting the train. There was one in the station inside the block clearance point; there was no fogman at the distant signal, while the signalman did not even set the road to an unoccupied line before giving "line clear" a second time. He admitted that he had acted wrongly and had done so on other occasions. The accident again emphasised, however, the paramount importance of taking the utmost care to word rules and regulations so as to admit of no doubt as to their exact meaning.

End of the "Leader" Class

THERE was some comment in the Press at the weekend on the fact that the "Leader" class locomotive of the Southern Region has been broken up, together with the two others of the same series that did not get beyond the early stages of construction. The decision to proceed no further with this design was reported in our May 25, 1951, issue, when it was stated that for various technical reasons the experiments with the prototype "Leader" class locomotive were not as satisfactory as had been hoped, and to obviate the expense which would have been involved in continuing them for a problematical return, it had been decided not to proceed further with this novel design. Originally 35 of these locomotives were commissioned by the former Southern Railway, but this number was reduced to five, and work was only carried out on three, of which one was completed. Investment in experiments is a risk that must be taken in the effort for efficiency, and the decision to renounce such ventures may be governed by

developments in other fields, particularly when motive power is involved. The appearance of the internal combustion engine in railway transport and developments in electric traction have enforced close scrutiny of the economic implications as well as the technical interest of experimental designs.

Further Competition from Air Fares

IT is evident from the announcement made last week of an expanded programme of air tourist fares for the coming summer, that one form of transport at least is satisfied that cheaper services will attract enough extra traffic to be remunerative. Mr. Peter Masefield, Chief Executive Officer of British European Airways, has already forecast a further reduction in fares when "the bigger turbine aircraft get into their stride." The temptation to dwell on the advantages enjoyed by the airways in not having to provide their own airports and communication systems must not obscure a handicap on the railways in countering competition of this kind. This is the fact that, having their fares policy made for them by the British Transport Commission, the railways may have to bolster up some other section of the Commission's undertaking. For example, when explaining the reasons for the present B.T.C. application for higher passenger fares, Lord Latham estimated a L.T.E. deficit in 1952 of £3 million, although the Executive's railways were expected to earn a working surplus about the same as they had done in 1951, when it was £500,000.

As far as British Railways themselves are concerned, their net receipts in 1951 of £31·7 million were an improvement of over £8 million on 1950. Passenger receipts to the end of November last year were still ahead of 1951 by £2,738,000, although in October a decrease of 4·9 per cent in second class journeys originating on the Southern Region suggests that Continental traffic shared in the general setback of that month. It is true that the latest passenger charges scheme does not affect long-distance main-line fares, but the railways incur some of the inevitable public displeasure and lose goodwill by being associated with a fares policy which can hardly be popular with the public and in view of the present trend of air fares is likely to be vigorously questioned.

The Tourist air fares to Paris by British European Airways next April will be £12 by day or £10 by night, these rates applying to all services except the "Silver Wing." By second class rail and first class boat *via* Dover-Calais the present fare is £11 19s. 2d. without meals. The air tickets include a meal service. "Silver Wing" travellers will pay £16, or 1s. more than at present, and their fare will include hot meals. The inclusive second class return (with Pullman supplement and meals) by the "Golden Arrow" service is £16 10s. 8d. It has long been appreciated that even without such competitive fares air travel has strong attractions on routes involving a sea crossing because of the time saved by the combination of speed and absence of transhipment. It is now being shown that on wholly overland routes considerable traffic development can take place when relative cheapness and quick journeys are allied. Since the introduction of the cheap air travel return of £8 between London and Edinburgh or London and Glasgow there has been a steady increase in patronage, which no doubt otherwise would be potential first class rail traffic. In the second week of December air passenger traffic between Edinburgh and London increased 260 per cent on the corresponding week of 1951. On these services meals are provided on four northbound journeys and light refreshments on the other two, with similar facilities southbound, both being included in the fare. Corresponding catering arrangements are made on B.E.A. services from London to the Isle of Man, and Belfast.

It is easy but unwise to discount the appeal of air travel by pointing to recent events such as services being paralysed by fog, and aircraft being diverted to airports far from their intended destinations. Another objection sometimes heard is that the lower fares have been accompanied by increasing the seating capacity of airliners, with consequent reduction in the amount of room for each passenger. But spaciousness is less necessary when the flight from London to Paris takes about the same time as must be allowed for a journey from, say, Watford, to join a boat train at Victoria. The "baby" car has shown already that roominess is cheerfully sacrificed for spaciousness even on long journeys, and today the motorised bicycle is demonstrating on many suburban roads that unlikely means of transport can exercise an unpredictable attraction. As a last resort it may be objected that the air cannot be a serious competitor with surface transport because of the limited carrying capacity of aircraft. Similar things were said about road transport in the past and have since been regretted. The air has given a warning against such complacency in the recent example of a capital city being supplied entirely by aircraft during the Berlin air lift.

Ulster Transport Authority

THE fourth annual report of the Ulster Transport Authority, for the year ended September 30, 1953, shows a trading loss of £243,543, or nearly double that for the preceding twelve months. During the year, U.T.A. buses operated some 33 million miles, with 99 million passenger-journeys, a decrease over the previous year of 600,000 miles and of 100,000 passenger-journeys. Passenger train-mileage was 1.6 million and railway passenger journeys 8.9 million, representing slight increases. During the year, passenger services continued to be provided over 152 of the 200 railway route-miles, the remaining 48 miles being worked over by goods trains only.

In freight traffic, U.T.A. road vehicles operated 13 million miles and carried 1.46 million tons of merchandise and 846,000 head of livestock, an increase of 233,000 tons and 145,000 head respectively. The report comments that part of the tonnage increase seems to be connected with public works, stockpiling, and irregular traffic, whereas reduced tonnages were mainly in those kinds of traffic of which there is normally a regular flow. The reductions are attributed partly to the growing number of privately-owned lorries, and partly to the trade recession. Traffic by rail was hit harder by the recession and the increased number of private lorries than were the road services, which, although also affected, had greater increases under other headings. There has, for example, been a loss of regular traffic in feeding stuff, coal, artificial manure, and smalls traffic to privately-owned lorries, while the Authority appears to have got an increased tonnage in materials for road improvement and other public development work, and of potatoes to processing factories.

The following are some other principal results:—

	1950	1951	1952
	£	£	£
Railway passenger traffic	613,587	556,871	600,625
Rail and road freight traffic ...	1,646,349	1,694,482	1,899,181
Parcels, luggage, etc.	197,972	189,964	207,778
Bus services	2,879,428	2,863,105	3,038,513
Hotels and catering	260,865	282,741	379,497
Revenue	5,640,007	5,628,154	6,167,147
Expenditure	5,853,640	5,757,831	6,410,690
Net operating revenue	−213,633	−129,677	−243,543
Mileage, railways open	200	200	200
Route mileage, bus services ...	2,575	2,582	2,600

If the four years' net financial results are apportioned between trading or operating results on the one hand, and non-trading items, such as interest, capital redemption, and preliminary expenses on the other hand, the following results emerge:—

—	Trading results	Non-trading expenses	Total deficit
	£	£	£
First year, 1948-49	52,303 profit	177,241	124,938
Second year, 1949-50	213,633 loss	205,645	419,278
Third year, 1950-51	129,677 loss	220,513	350,190
Fourth year, 1951-52	243,543 loss	226,908	470,451
Four years totals	534,550 loss	830,307	1,364,857

The principal change in passenger rolling stock was

conversion of further coaches to diesel propulsion. The report for 1950-51 mentioned conversion and introduction on the Belfast-Bangor line of three carriages operating as a three-coach diesel train, but pointed out that steam traction could not be replaced by diesel unless larger trains could be operated economically, and that a number of six-coach multi-engine diesel trains was to be built. The first of these was placed in service between Belfast Queens Quay and Bangor in May, 1952; it was built at the U.T.A. workshops at Duncrue Street, Belfast, from existing centre-corridor coaching stock. No information is available as to the volume of traffic accruing from dieselisation of the Bangor line, on which only one train in four is now rostered as steam worked.

The report describes the many commercial measures taken by the U.T.A. to promote tourist travel in the Six Counties, such as seven-day and other extended tours. Close contact was maintained with the Northern Ireland Tourist Board, the Ulster Development Association, the Belfast municipal transport undertaking, the various cross-channel shipping and air service operators, and tourist agents in Great Britain, the U.S.A., and elsewhere. The gross revenue of the Authority's hotels and catering department rose with little increase in tariffs. A decline in refreshment-car receipts on the Belfast-Londonderry line necessitated reduction of facilities. The refreshment rooms and hotels generally did satisfactory business. The proportion rose of guests from outside Northern Ireland at the two principal U.T.A. holiday hotels, the Slieve Donard (formerly B.C.D.R.) at Newcastle and the Northern Counties at Portrush, which are frequented less by the Ulster public, probably because of a growing tendency to go to Great Britain or abroad.

Development in Rhodesia

IN Rhodesia probably more railway survey and construction are in hand than in any other country. In addition to the £1,000,000 Bulawayo development scheme, extensive remodelling works are being carried out at Lochinvar outside Salisbury, Ndola, Broken Hill, and Livingstone. The main line is being deviated near Chingola for 9½ miles, and to bring the Salisbury line into Bulawayo by a new route, partly to abolish level crossings, requiring 5½ miles of track. A far larger deviation is being undertaken between Dett and Wankie, 43 miles on the main line between Bulawayo and Livingstone; this work is estimated to cost £1,500,000. It will flatten the ruling gradient from 1 in 61 to 1 in 120, and thus enable "15th" class Beyer-Garratt locomotives to haul 1,300-ton loads between Wankie and Dett, where the limiting load at present is 785 tons. Speed restrictions on 187 curves will also be removed, and the overall distance between the two stations will be shortened by about four miles.

The works involved between Dett and Wankie include four major bridges and the excavation of some 16,000 cu. yd. a mile to form cuttings. A considerable fleet of earth-moving plant is being used, containing large tractors, scrapers and lorries, and the largest ripper in South Africa. To economise in locomotive power and wagon usage, track materials are being run out on a low-loader, and for girder erection at the Lukosi bridge, which is 220 ft. in length, 100-ft. launching girders are being used for the first time.

The considerable volume of work already in hand, is nevertheless insignificant compared with the programme of construction projected, which is likely to prove of vital national and even international importance. The first of these is the proposed South-east trunk line to provide a new outlet from Rhodesia to the Indian Ocean at Lourenço Marques in Mozambique. It will run from Bannockburn on the Shabani branch of the Rhodesia Railways to the Portuguese frontier, a distance of 204 miles, in Rhodesian territory; the remaining 172 miles in Mozambique to Guija, whence a 132-mile line exists to Lourenço Marques, will be constructed by the Portuguese. The Rhodesian section of this construction is estimated to cost about £4,500,000, and it is hoped that it will be completed early in 1955. The through distance from Bulawayo to Lourenço Marques will be about 675 miles, or almost the same as that to Beira.

The second proposed construction is the Sinoia-Kafue chord line, an even larger undertaking from the Rhodesian point of view. Though there have been three surveys of this route generally, in 1916, 1932 and 1952, the final alignment has not yet been selected, but it seems certain that it will entail about 250 miles of new construction to effect an overall reduction of 520 to 560 miles in rail distance between Beira and Salisbury, and Broken Hill, the copper-producing centre in Northern Rhodesia. Unfortunately, a descent of about 3,500 ft. into the Zambesi defile and a corresponding ascent beyond, and gradients of 1 in 45 over long distances are unavoidable. Heavy construction work is also involved and curvature is bound to be sharp and almost continuous. Construction, operating, interest and maintenance costs will all be high, and it seems unlikely that even a saving of well over 500 miles in haulage of existing traffic will warrant such expenditure. There is, however, the prospect of rapid development in Northern Rhodesia and consequent expansion of traffic, and a further important factor is a hydro-electric scheme with a dam near the proposed rail crossing of the Zambesi, which may provide comparatively cheap traction power. In any case, whatever the pros and cons, the decision to build the line or not will almost certainly be made on Commonwealth rather than on purely railway financial merits.

Electric Traction Acceleration and Braking

DURING the early development of rail traction at the commencement of the 19th century, it was thought that the adhesion properties of smooth rails would be inadequate, and various attempts were made to use other methods of propulsion—rack rail and cog wheel and so on. Trials with the first "adhesive" locomotives proved that wheel-to-rail adhesion was not an insurmountable problem. In more recent years, particularly with electric traction, renewed attention has been focused on the limitations imposed by adhesion between wheel and rail, and this formed the subject of a paper "Limitations of Acceleration and Braking With Electric Traction," delivered before the Institution of Locomotive Engineers on January 14, by Mr. A. S. Robertson, Chief Traction Project Engineer, English Electric Co. Ltd.

With the steam locomotive, wheel slip will occur only when the adhesion limit of all coupled driving axles is exceeded, said Mr. Robertson. If slip does occur, no appreciable damage is done to the locomotive through overspeeding; the driver is aware that slipping is taking place, and can take steps to check it. With electric transmission it was rather different. The conventional arrangement of electric drive was the individual axle drive on both locomotive and motor-coach stock. With the individual drive, one motored axle could slip independently of the other driving axles. In contrast to steam, the driver might not be aware of the slip, as the slipping motor might be at some distance from him.

With improvement in design and manufacturing techniques, it had been possible to build electric locomotives in which the power equipment and mechanical parts were becoming appreciably lighter. Adhesion at starting was still of major importance; in consequence, where possible, the modern electric locomotive was a total adhesion locomotive, making the maximum possible use of the locomotive weight. Having developed the electric locomotive to this stage, the performance was very largely confined by the limitations imposed by adhesion during motoring and braking. Weight reductions in the power equipment, said Mr. Robertson, were closely tied up with equipment limitations affecting performance, and had to be closely related also to the limitations imposed by adhesion, and from the evidence available it was probable that relatively high values of adhesion could be obtained under favourable wheel and track conditions.

Even on well maintained track, it was probable that small irregularities would initiate wheel slip, particularly when working at high speed and high tractive effort. Adhesion

values up to and above 20 per cent could be obtained even at high speeds, but the probability of obtaining such a high figure at high speed was uncertain and depended to a large extent on the state of the track. With non-metallic brake blocks there was a further drop in the practical limit of adhesion owing to the polished condition of the wheel tread surface; this might amount to a reduction of as much as 20 per cent. Higher adhesions could be sustained under favourable conditions without wheel slip, particularly at lower speeds, but if used regularly would lead to wheel slip and loss of performance.

The Year on the Canadian National Railways

INDUSTRIAL development which during the past five or six years has done much to strengthen the Canadian economy has at the same time created an anomalous situation for Canadian railways. This was evident in 1952 and promises to be just as marked during the coming year. The continuing surge of business expansion has been accompanied by an increase in freight tonnage hauled over Canadian lines. Each year since 1946 has seen new records set in gross revenues but net revenues, with the exception of one year, have steadily declined in percentage terms. Mounting costs, which have outstripped increased revenues, are the reason. Between 1945 and 1951 gross revenues rose by 44 per cent but operating costs by 64 per cent. The financial results of the C.N.R. for 1952 will not be known until the final figures are in and cannot even be estimated until present uncertainties have been resolved, but Mr. Donald Gordon, Chairman & President, reviewing C.N.R. developments last year, says it is apparent that this trend is continuing.

Whatever the final result for 1952, the Canadian National Railways will present a different financial picture to the public from that of any other year. This is because the Canadian National Railways Capital Revision Act of 1952 altered the company's capital structure so that, for the first time in its history its fixed interest charges bear a reasonable relationship to earning power. The Act did not write off any of the money invested in the railway, nor did it guarantee the system against income deficits, irrespective of the relationship between rate and cost levels. The company's problem is to achieve a reasonable balance between revenues and expenses. The C.N.R. is the largest industrial buyer of materials in Canada, and last year it again had to pay substantially higher prices for its supplies; in the first nine months of the year, the cost of sleepers rose 18·36 per cent, of rails 7·14 per cent and of steel 8·85 per cent, and the general index of railway material prices was up 6·64 per cent.

The railways have just concluded an agreement with their non-operating employees based on the report of a board of conciliation, whose main provisions called for a wage increase of seven per cent plus seven cents an hour, with effect from September 1. This will increase the wage costs of the C.N.R. by nearly $30,000,000 a year, and for the year 1952 will add approximately $7,500,000 to operating expenses. An additional $4,000,000, on an annual basis, has been added to the wage bill as a result of new agreements signed earlier in 1952 with engine drivers and conductors. Settlements have not yet been reached with the trainmen and firemen.

Competition from road hauliers was intensified in 1952. The company has already taken steps to meet this competition, including the adoption of agreed charges and rate reductions, and the extension of railway-owned and operated bus and lorry services where it found that they could supplement railway operations and give a better service to particular districts. It has introduced a railway-road freight service between Montreal and Toronto, in which railway-owned road trailers are loaded and placed on specially-designed flat wagons for conveyance by rail between the two points, and the goods are delivered by road to final destination.

Freight tonnage moved by the Canadian National last year showed increases chiefly in grain, petroleum products, machinery, and construction materials. Principal decreases were forest products, wood-pulp, motorcars, and livestock. During and since the war, largely because of shortage of steel and other materials, the company has had difficulty in building up a fleet of new rolling stock. Although the supply of freight stock has improved it was only in 1952 that a real start could be made on making up the deficiency of coaches. In the past year, 7,310 freight units and 31 passenger units were delivered. During the past two months orders were placed for 300 coaches and 3,730 wagons. One hundred and sixteen diesel locomotives were placed in service and 52 more are for delivery in 1953. A diesel training programme for employees is making good progress.

A contract has been awarded for clearing and grading the right-of-way for the line from Terrace to Kitimat in British Columbia. On the new line to Lynn Lake in Manitoba rails have been laid from Sherridon to the Churchill River. Two of the three steel bridges required to cross the Churchill River have been erected and the third is under construction. It is expected that grading and clearing now in progress between the river and Lynn Lake will enable this new line to be put into operation next Autumn as scheduled. Other major construction projects include loading facilities at Prince Rupert for barges operating on the Pacific Coast, new wharves and facilities at North Sydney and Port-aux-Basques for the Newfoundland ferry service, additional track and yard facilities in Montreal and Toronto, and the new Bonaventure freight terminal in Montreal.

Innovations in sleeping, dining, and parlour car services included the use of plastic headrests, table tops, and dishware, stainless-steel hot water and teapots. The company is studying the use of pre-cooked frozen food and is experimenting with the sale of groceries on café cars to immigrants travelling in special trains. A new pension plan has been well received by employees. All workers willing to contribute to the pension fund can add considerably to the amounts which they will receive on their retirement.

The new extension to the Macdonald Hotel in Edmonton is nearing completion. Work is progressing on a new and larger central building at Jasper Park Lodge, which will be ready when the Lodge reopens in June. A plebiscite in North Vancouver gave the Canadian National right to reach the harbour front at Vancouver with its own power. It will thus be able to play a prominent part in the development of the important North Shore industrial area of Vancouver as a result of having acquired railway facilities of the National Harbors Board in Vancouver and the Second Narrows Bridge.

Kowloon-Canton Railway

THE report for the year ended March 31, 1952, of the British Section of the Kowloon-Canton Railway states that the stringent immigration and emigration regulations brought into force by the Chinese Government in February, 1951, and restrictions on the import and export of various commodities from and to the Crown Colony in operation throughout the year resulted in a large decrease in both passenger and goods traffic to and from the interior. Gross income was $5,509,916.32 compared with the previous year's record figure of $10,366,796.75, while net revenue was only $850,131.86 compared with $6,122,363.83.

The following are some of the principal results:—

	1950-51	1951-52
	Thousands	
Goods tonnage conveyed	372	237
Passenger journeys	6,055	3,513
	$ H.K. thousands	
Goods receipts	2,871	1,721
Passenger receipts	7,158	3,286
Gross railway receipts...	10,367	5,510
Railway operating expenditure	4,244	4,660
Net operating revenue	6,122	850

The year was comparatively uneventful, many difficulties previously experienced disappearing because of the drop in traffic. The shortage of coaching stock was still felt at weekends during the winter, when there was overcrowding, but this it was hoped would be alleviated by the arrival

of new coaches towards the end of 1952. The delivery of new goods rolling stock was nearly complete. Rehabilitation of the war-damaged workshops was completed with the erection of a new foundry to replace the old. Mention is made in the report of dieselisation as a possible means of reducing working expenses. Although both passenger and goods traffic showed a drop compared with the preceding year, on January 29, 1952—the last day of the Chinese New Year Holidays—41,734 passengers were carried, a new record for this short railway. To cut down running expenses, a new timetable was brought into operation on May 1, 1951. The daily train service was reduced to 20 steam and two railbuses with occasional goods trains when required. At weekends throughout the year, late night leave-specials were run for the benefit of Services personnel stationed in the New Territories. Passenger train punctuality was satisfactory despite delays caused by routine police searches, and the entraining and detraining of large parties of troops in ordinary trains.

Deliveries from the United Kingdom of all-steel bogie wagons comprised oil tank, flat, and low- and high-sided wagons, of weights varying from 44 to 45 tons.

LETTERS TO THE EDITOR

(The Editor is not responsible for opinions of correspondents)

Aluminium Alloy Coaches

January 16

SIR,—I was very pleased to read the interesting article in your January 16 issue, by Mr. T. W. Barrow, wherein he states that an early example of the use of aluminium sheeting for railway rolling stock was the Liverpool - Southport trains built in 1910.

In connection with a forthcoming publication of this Association dealing with rail transport, some research was made into the earliest known example of the use of aluminium in this connection, and I should like to add that it would now appear that this is its first known use in stock for an electrified scheme and the actual date was 1905.

It was essential for the motor cars on that line to have a reduced axleload so that traffic could pass between the Lancashire & Yorkshire and the Liverpool Overhead railways. It is interesting to note also that a number of interior fittings used cast aluminium components to obtain the low weight.

For those interested in historical facts regarding this application, attention may be drawn to a paper by Mr. F. E. Gobey, published in the *Proceedings of the Institution of Civil Engineers*, Volume CCVIII, 1918-19, Part II.

Yours faithfully,

M. H. P. LEVIE

The Aluminium Development Association
33, Grosvenor Street, London, W.1

Use of Fitted Stock

January 16

SIR,—In round figures the total freight rolling stock of British Railways is 1,094,000, of which 150,000 units are fitted with the vacuum brake complete or with through vacuum pipes.

Recent information given regarding the standardisation of freight train speeds shows that to lift the average speed of an express freight train from 40 to 50 m.p.h. it is necessary to use three times the number of fitted vehicles—in a class "C" train where the average speed over a normal section of line is 50 m.p.h., the whole of the train must be composed of fitted stock; in a class "D" train only one-third of the train must be so fitted.

The present-day trend towards an increase in the number of class "C" trains scheduled to run daily must be a heavy drain on the limited number of fitted vehicles available. Assuming that the numbers of class "C" and class "D" trains run daily are equal, then by withdrawing the class "C" schedules the numbers of class "D" trains which could be run would be increased fourfold.

This greatly increased number of trains running at an average speed of 40 m.p.h. would considerably improve line occupation. It might also reduce delays caused at present by loss of time in running as engines would be working with a greater reserve of power. In this respect it should be borne in mind that from an operating point of view a train which is declassified because of a shortage of fitted stock causes nearly as much disruption to the schedules as one which loses time in running.

Against the operating benefits thus obtained must be set an increase of approximately a quarter in the booked journey times of existing class "C" trains but such an increase should not make it impossible to give "day-to-day" transits between our principal towns and cities. The increase in the number of class "D" trains which would result would most probably mean that traffic for which there is no room on existing express freight services could be included in the new services.

Criticism of present-day transit times is heard on all sides. Is the answer fewer "flyers" but more freight trains of above medium pace? Should we cease to concentrate our capital of fitted vehicles but "spread the load" and obtain a better all-round performance?

Yours faithfully,

E. J. MURPHY

227, Devonshire Road, London, S.E.23

Indicating Train Formations

January 14

SIR,—I was interested to read in your January 2 issue that the S.N.C.F. has installed train formation indicators at some of its principal stations. Whilst not wishing to minimise the efforts made since the war to improve services, and the S.C.N.F. is certainly entitled to great credit, train formation indicators were a feature of the German State Railway for some years before the war.

The usefulness of train formation indicators cannot be denied, and if British Railways cannot see the way to follow the example set by the French, it would be possible, at any rate, to give some indication over loudspeaker systems to intending travellers, who would then know where they would find their appropriate compartments at a terminus station when the train is already in, or where to stand on the platform at a "through" station whilst awaiting the arrival of the train.

In this connection, such an arrangement would possibly be of assistance in the case of trains which, on account of length, have to pull up twice at certain stations. I have in mind Wellingborough on the L.M.R., and on each occasion when the train has had to pull up twice—with the attendant loss of time—I have not failed to ask myself why could not passengers alighting at Wellingborough be told, either by the loudspeaker system, or by the ticket-examiner at the platform barrier, to get in the front of the train. Similarly, arrangements might be made for parcels and mail for that destination to be deposited in the front van instead of in the rear van. Possibly the reason for this is that they would not be in charge of the guard during the journey, but they could, on the other hand, be locked in the van.

The foregoing suggestion might contribute to better time-keeping by trains between St. Pancras and Sheffield Midland—and good time-keeping is another feature in which the French National Railways are excelling at the present time, as you have reported on several occasions.

Yours faithfully,

F. S. MIDDLETON

49, Kenwood Park Road, Sheffield, 7

THE SCRAP HEAP

Motors per Man

The *Annual Bulletin of Transport Statistics* for 1951 published by the Transport Division of the Economic Commission for Europe shows that Britain had more private motorcars per head of population, 20 in 1951, than any other European country. The number of buses per head of the population at 656 also was the highest in Europe. In 1951, Britain had 2,437,694 private cars, 120,976 more than the previous year. Sweden, which came second to Britain in cars per head of population, had 313,058 cars, an increase of 60,555, France had 1,700,000 cars, an increase of 180,000; and Western Germany, 681,573, an increase of 81,000.

A Train Auctioned

Interest was caused in the Press in Melbourne a short while ago by advertisements offering a train for sale on behalf of the Victorian Railways Commissioners. The rolling stock to be sold consisted of a 0-6-0 tender engine, a passenger carriage and van, a rake of flat-top wagons, an old Sentinel locomotive, and some workshop equipment. It was formerly the property of the Shire of Kerang which operated an independent 5 ft. 3 in. gauge tramway 14 miles long, from Kerang in northern Victoria to Koondrook on the River Murray, opposite the New South Wales town of Barham. The line was opened in 1889.

Since the opening of the tramway a variety of locomotives has been used, the last a former Victorian Railways "T" class 0-6-0 tender engine. The tramway used its own passenger carriage and van, but most goods stock was taken over at Kerang from the Victorian Railways and returned to them in due course. The carriage was a bogie American-type coach, built in 1887, with platforms at each end, and the van a former V.R. "Z" class six-wheel type. Both carried a nameboard inscribed "Kerang and Koondrook Tramway."

The total realised at the auction sale by the Victorian Railways at Koondrook was £427 (Australian).

Nursery of Railways

Feelings on railway matters clearly run as high in the next world as in this, and the message from George Hudson reproduced in our January 9 issue was not long in provoking a reply signed by Captain Mark Huish and dated from Euston Square. This communication reads:—

SIR,—I regret that you should waste your valuable space on the vapid outpourings of the braggart York counter jumper — George Hudson. This adipose, gambling North Country Bubble displays his usual lack of railway knowledge and in the interests of historical accuracy I am impelled to point out that neither he nor the North Eastern can claim any credit for the cradle of world railways. Only because of its location did the Stockton & Darlington Railway eventually lose its proud independence to the ever-smug North Eastern. And in fairness to my late directors I must add that if the Stockton & Darlington was the cradle of our railways, then Euston Station or, to be more accurate, some of the rooms reached from the Great Hall, constitute the nursery. It is a comforting thought that a few of the nurses are still there.

It would indeed be interesting to know why he champions the North Eastern, a parochial railway if ever there was one, which, if it had had its way after grouping, would have erected customs barriers at Shaftholme Junction and Berwick Marshall Meadows.

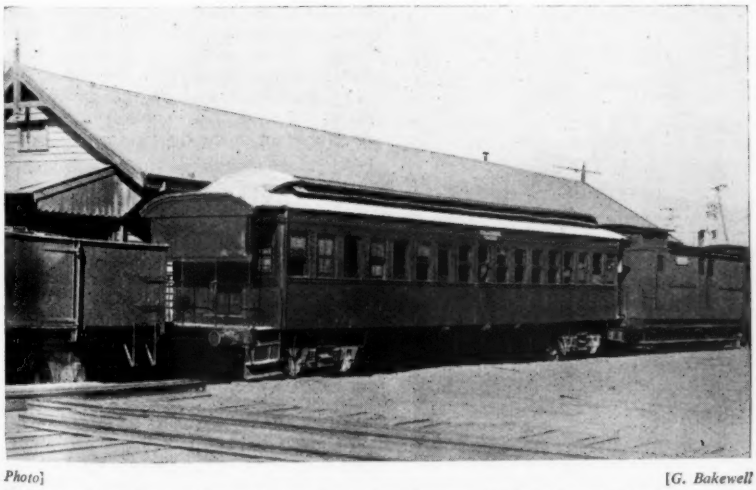
By remarking that the Eastern Region should be allowed to sink or swim the erstwhile draper runs true to form. His cowardly desertion of the Eastern Counties Railway in 1849 is not yet forgotten.

Indeed, in only one respect do I find myself in any agreement with his effusion and that is that far too much has been heard in recent years of the Great Western tradition. And in the interests of all who use our railways I would urge that immediate steps are taken to expose a disgraceful conspiracy which, I am told, is now being grandiosely hatched in the Great Western Royal Hotel in anticipation of regional autonomy, namely the readoption of the Broad Gauge.

I have the honour to be, Sir,

Your obedient servant,

MARK HUISH (CAPTAIN)



Photo] *[G. Bakewell*

Old coach and van formerly used on the Kerang & Koondrook Tramway and sold as outhouses by the Victorian Railways

Ode to the Steam Locomotive

Hail Friend! who through the years—
in ages past—
Hath thundered on thy way midst hill
and vale,
'Neath summer skies—'gainst winter's
icy blast,
Would thou could tell the great romantic tale.

On Briton's Isle thou first did'st see the
light,
Devised by men whose genius gave thee
birth,
As yet so strange—minute—but great in
might,
Thy wondrous deeds acclaimed o'er all
the earth.

In stature through succeeding years ye
grew,
With added power ye faced the strain
and stress,
To serve mankind ye gathered strength
anew
And toiled in many spheres of usefulness.

In myriads now ye throng the world's
highways,
Giants of the roads which nations have
enrolled
To aid thy mission—a goodly one
always—
Majestic Steed! Ye thrill the young—
the old.

But whispered 'tis—thy days are nearly
o'er—
That others soon may wrest from thee
the crown
Of great achievements—that thou wilt
have no more
An honoured place 'mong giants of high
renown.

Fear not, my Friend! methinks mankind's in need
Of all the powers that genius doth provide,
And with new welcomed friends our
fiery steed
Will share the daily tasks with conscious
pride.

J. B.

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

SOUTH AFRICA

Cape Midlands Improvements

Work has begun on a new marshalling yard at Noupoort, a junction on the Cape Midlands main line from Port Elizabeth to the interior. Initially, twelve tracks are being laid in the yard, which is so planned that it can be extended considerably if necessary.

Work is proceeding on the deviation and improvement of the line between Bushmans River and Witmos as part of the scheme to improve the Cape Midlands main line. The next stage of the work to be undertaken will be between Witmos and Drennan.

New Yard at Kroonstad

Because of the development of the Orange Free State gold mines and industrial expansion in the Kroonstad area, the marshalling yard at Gunhill has become too small to cope with the traffic. A large marshalling yard is therefore to be laid out on the northern side of the Vals River, at Kroonstad. Fifteen roads will be laid at first, and there will be a small wagon repair yard. The present marshalling yard at Gunhill is on the south side of the river where there is little room for expansion, but six more tracks are, however, being added to the yard there.

Natal Main Line Doubling

The doubling of the Natal main line between Nottingham Road and Rosetta, four miles, is nearing completion. It has involved a slight deviation of the existing line to improve curvature.

The Tweedie-Lions River (three miles) and Dragle-Lidgetton (two miles) sections have already been doubled. The sections between Estcourt-Ennersdale (seven miles), including the remodelling of Estcourt station and yard; between Rosetta and Mooi River (seven miles), involving a new tunnel half-a-mile in length, a new bridge over the Mooi River, and a bridge over a national road; and between Frere and Colenso (twelve miles) are now being doubled.

RHODESIA

Location of the South East Link

Following the preliminary survey of the South East Link from Bannockburn, on the Shabani branch line, to Boundary Post No. 14 on the Rhodesia - Mozambique frontier, a distance of 207 miles, the location was completed by the end of October from Bannockburn to Sarahuru, near the Beit Bridge - Fort Victoria road. The distance then located was 87 miles, but the first 30 miles had taken five months because of the difficult country traversed and persistent rain until March. The route beyond the frontier is being surveyed by Portuguese railway staff.

BELGIAN CONGO

Kamina - Kabalo Line

Work has begun on a 200-mile connection between Kamina, on the Elisabethville - Port Francqui main line, and Kabalo, on the Albertville - Kindu line of the Upper Congo - Great African Lakes system. A 500-metre bridge is to be built over the River Lualaba at Kabalo.

The work will take some three years. At the same time the gauge of the Albertville - Kindu line will be converted from metre to 3 ft. 6 in. The new line will complete railway communication between Southern Africa generally and Lobito Bay on the Atlantic on the one hand, and Dar es Salaam on the Indian Ocean on the other, except for the crossing of Lake Tanganyika between Albertville and Kigoma. A map of the Belgian Congo lines appeared in our January 9 issue.

CHINA

Transfer of Changchun Railway

The Changchun Railway in Manchuria was handed over to China by the joint Chinese-Soviet administration at a ceremony in Harbin on December 31. The transfer took place in accordance with the Chinese-Soviet agreement of 1950. The railway extends across northern Manchuria from Manchouli in the west to Suifenho (Pogranichnaya) in the east, the frontier stations with Soviet Russia, and from Harbin on that line south to Changchun, Mukden, and Port Arthur. It is not known how much of the railway is now 5 ft. and how much standard gauge.

CANADA

C.N.R. Aquisition at Vancouver

The National Harbors Board Terminal Railway at Vancouver was turned over to the Canadian National Railways on January 1. The railway extends along the waterfront in the cities of Vancouver and North Vancouver and the district of Vancouver. The C.N.R. has acquired some 20 miles of harbour lines and sidings and has gained running powers over nearly 10 more miles of line. It now has direct access to Tidewater, to Burrard Inlet, and the North Shore. The acquired facilities are to be used mainly for serving harbours, but the C.N.R. will also be able to provide direct service for general industrial development in the districts.

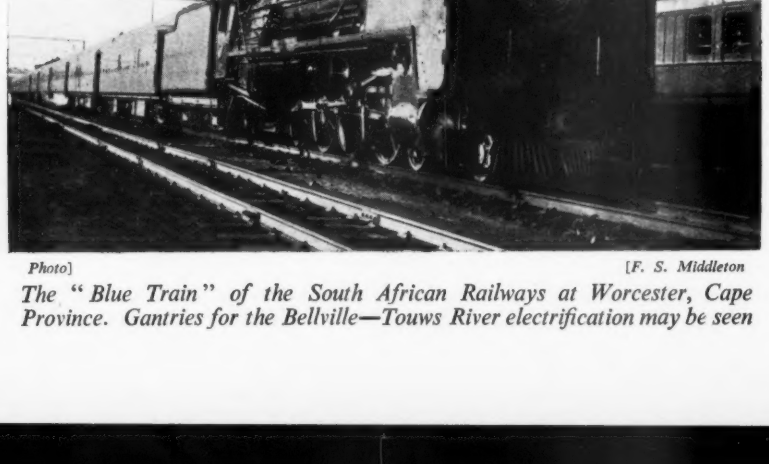
UNITED STATES

Gas-Turbine Locomotive Developments

The Union Pacific Railroad, which already has in service or on order ten gas-turbine-electric locomotives manufactured by the American Locomotive Company, has ordered a further 15 units of the same type. At the same time it has decided to convert fifteen of its large "Challenger" 4-6-6-4 articulated steam locomotives from steam to oil-firing, to render its operation progressively more free from the use of coal, the adequate supply of which is always uncertain in present conditions.

The second experimental American

The South African "Blue Train"



Photo] *[F. S. Middleton*

The "Blue Train" of the South African Railways at Worcester, Cape Province. Gantries for the Bellville—Touws River electrification may be seen

gas turbine design — that produced jointly by the Westinghouse Electric Company and the Baldwin-Lima-Hamilton Corporation—is a 4,000-h.p. unit, which has now undergone tests on the Pennsylvania, Missouri-Kansas-Texas, and Chicago & North Western. These tests were the most severe on the Pennsylvania, where the locomotive handled express passenger trains of 26 to 29 passenger coaches (1,550 to 1,800 tons of 2,240 lb.) over a total distance of 7,100 miles. On the Missouri-Kansas-Texas trains of 11 to 15 coaches were hauled for a total distance of 27,755 miles, and on the Chicago & North Western from 12 to 17 vehicles (700 to over 1,000 tons) were worked over a distance of 15,052 miles.

IRELAND

Increase in Rates and Fares

C.I.E. rates and fares are to be increased by 7½ per cent from February 2. The increase is expected to yield revenue of about £585,000, but as extra expenditure since April 1, 1952, has totalled £700,430, there will still be a shortage of £115,000. This deficit will have to be met by further economies and the Chairman has stated that besides the proposal to apply to close ten branch lines, the company has under consideration the closing of seven more, making a total of 17 of its 37 branch lines now worked. On the subject of the drift from train and bus services to private motorcars the Chairman said that in 1937 there were 45,000 private motorcars in the Republic, but last year 110,000 were registered.

Shorter Week for C.I.E. Officials

The experiment agreed on by the Transport Salaried Staffs Association and C.I.E. at a Joint Industrial Council meeting, and put into operation in Waterford, has been successful. The staffs claimed a shorter week in the Dublin, Cork, Limerick and Waterford goods depots as an experiment. The Council directed that the shorter week claimed—39 hours against 44—be allowed to operate in Waterford goods office.

The Board of C.I.E. has notified the union and the Industrial Council of the success of the experiment in Waterford, which will now be extended to the other depots for which the claim was made. The agreement is conditional on the same amount of work being done in a 39-hr. as in a 44-hr. week, on no additional labour being employed and no overtime worked.

C.I.E. Railcars

Eighteen of the 64 diesel railcars ordered by C.I.E. have now been delivered and eight are now in service. Four are narrow-gauge, operating on the West Clare line and four are running in regular service between Dublin and Waterford. They have proved an unqualified success and are popular.

The remaining 46 cars will be delivered at the rate of three a week between now and early summer. The total cost is estimated to be about £800,000. Those intended for Dublin south-eastern suburban services will be formed by the inclusion of trailer coaches into trains accommodating 250 passengers and a faster and more frequent service will be provided. During the winter months it is proposed to operate the "Enterprise" express between Dublin and Cork by diesel train and tests are being carried out.

Publications Received

La Traction Electrique et Diesel-Electrique. By Pierre Patin. Paris, 1952. Editions Leon Eyrolles, 61 Boulevard Saint Germain. 10¼ in. × 6½ in. 299 pp. Illustrated. Price fr. 2,500.—Although mainly concerned with French railway practice, the development of direct and now of alternating current traction technique in that country makes this book of wide general interest. The author has dealt in more detail than usual in a work intended for students of electrification with the mechanical aspects and construction of electric locomotives. These sections include a treatment of the mechanics of locomotive movement on straight and curved track. Proceeding to more specifically electrical matters, the author has included a survey, with diagrams, of several types of flexible transmission used on the Continent. The chapters on electrical equipment are accompanied by numerous diagrams showing portions of the various circuits and omitting detail which might tend to confuse the student. There are many illustrations of the various elements in the power and control equipment of a modern electric locomotive. The types illustrated are all French, and are represented by broadside views which enable the mechanical features to be readily seen and associated with the diagrams elsewhere. In later pages power generation and distribution are dealt with, this section including design of catenaries. Alternating current traction at low frequency is referred to somewhat briefly, but considerable space is naturally devoted to 50-cycle locomotives, with circuit diagrams illustrating the various systems so far adopted. Diesel-electric practice is covered in some 20 pages mostly devoted to shunting locomotives used in France. An appendix contains outline diagrams, with dimensions, of the latest French electric and diesel-electric locomotives.

Motive Power and Rolling Stock for Railways.—We have received from the Forges Usines et Fonderies de et à Haine-Saint-Pierre an illustrated brochure, handsomely bound in leather covers, showing the whole range of the company's equipment for railways. A double-page illustration at the beginning of the brochure compares various types of steam and electric locomotives built at these works since 1849, the year in which the company began to build locomotives for the Belgian State Railways and various industries. In 1921 the manufacture of wagons of all types was begun, and in 1948 railcars were added to the company's products. Steam locomotives have been supplied to railways in Brazil, China, Africa, and elsewhere. Miscellaneous products include cranes, cast steel wheel centres for locomotives and rolling stock, large gear wheels, and marine propellors.

Calendars for 1953.—We acknowledge the receipt of calendars from: Swedish Lloyd; the Railway Passengers Assurance Company; *The Irish Times;* London Spinning Company; Merritt & Hatcher Limited; and Newman Neame Limited.

Bon Voyage! General Information, Winter, 1952-53. Published by French Railways Limited, 179, Piccadilly, London, W.1, and obtainable from leading travel agents.—The usual comprehensive information on travel over the French National Railways comprises details of the various fare concessions, sleeping accommodation, customs regulations, and road transport facilities; the last include inter-station bus services in Paris and self-drive car hire in Paris and the provinces, besides S.N.C.F. motorcoach services. Photographs are reproduced of ordinary corridor coach and *couchette* interiors and of French National Railways new cross-Channel vessels.

The Specialised Film.—Advice on the use of the cinematograph film as a sales promotion or public relations medium is contained in a booklet published by Kinocrat Films Limited. The various types of film and appropriate lengths are discussed, after which the reader is given an outline of how his ideas are handled by the producer and script writer, and an idea of the time required for different stages of the work. A concluding section tabulates some representative costs per minute of screen time.

The Collapse Method of Design.—Professor J. F. Baker, whose work some 15 years ago showed that the ultimate strength of a portal could be estimated with considerable accuracy by the theory of plasticity, has since 1945 applied his methods to evolving an entirely new and much more rational principle of designing beams and rigid frames. In this work he collaborated with the British Constructional Steelwork Association, and its results have been embodied in the present publication, which presents them in a form calculated to appeal to the structural engineer. Technical Brochure No. 5 is the first of a series on the application of the plastic theory to the design of mild steel beams and rigid frames.

Light-Load Electrification

Shorter and more frequent trains to improve substation load factor

By B. J. Prigmore, M.A., M.Sc. A.M.I.E.E.

ONE of the more expensive features of applying an electrification scheme to lightly-loaded lines is the provision of the requisite number of substations, if conventional services, of normal length trains at relatively infrequent intervals, are to be operated. For such a scheme a substation capable of handling a train may be needed every five or six miles (taking outer suburban practice on a 600-volt conductor-rail installation as typical), yet there may often be periods when there is no train on the section supplied by a substation. The ratio of lineside equipment costs to vehicle costs will thus be high whilst the load factor of each substation will be low.

A better situation would exist if a line could be electrified with fewer substations, and if the load factor of each of these could be improved. This would obtain if there were to be at least one train per substation along the route. The possibilities and limitations of such an electrification are examined further in this article.

Electrification of many relatively lightly-loaded lines might be feasible, particularly if they were associated with an adjacent large-scale electrification, if a scheme could be devised to provide a sufficient flow of seats per hour yet also to ensure that there should be at least one train per substation. This criterion, of one train per substation, is chosen because it seems to the writer to represent the approximate limit for electrification of those somewhat lightly-loaded lines which are already operated electrically, albeit by conventional methods. The proposed method of operating a lightly-loaded line to permit low-cost electrification by minimising the capacity and number of substations required, is the simple one, suggested earlier in *The Railway Gazette* mainly as a means of attracting more traffic, of operating "shorter trains and more of them."

The technical possibilities of such a scheme will be considered first. The criterion for maximum substation spacing on lightly-loaded lines is in general that the minimum track fault current (limited by the conductor resistance of the fault path on remote faults) shall exceed the maximum accelerating current of a train. This ensures that a substation track circuit-breaker can be set to trip and clear the faulty section on a remote fault occurring, yet that the breaker will not trip when an accelerating train is on the section adjacent to the feeder point.

This may be considered more rigidly in Fig. 1, which shows a single-track third rail electrification between substations 1 and 2, operating at constant voltage V, and distance D apart. With a single-track "go and return" resistance of R per unit length, the track conductor resistance between circuit-breakers A and B is RD. If the train accelerating current is I, then the circuit-breaker trip setting is kI, when k (often 1·5) is a safety multiplying factor to make certain that an accelerating train will not trip the circuit-breaker when starting outside the substation.

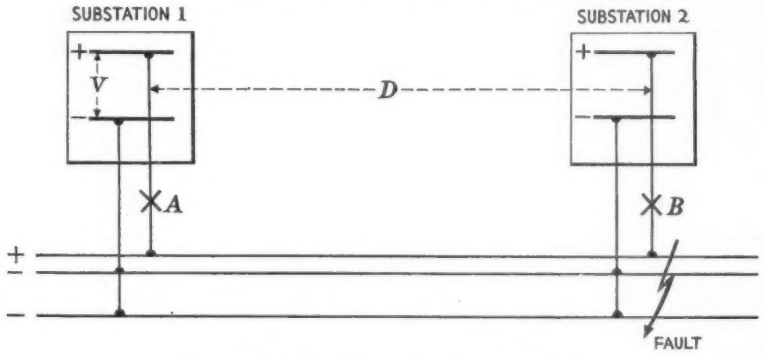


Fig. 1—Substation arrangement and spacing

Influence of Fault Current

If a short-circuit fault occurs as shown, at the feeder point from circuit breaker B, this breaker will trip at once, but breaker A will continue to feed fault current to the circuit from substation 1; this breaker will trip and isolate the faulty section only if the fault current flowing exceeds its tripping current. If, then, the substations are a maximum distance D apart, this fault current must be at least equal to the breaker tripping current, hence

$$kI = V/RD$$

whence $$D = V/RkI$$

This shows that if a motor coach train-length is halved (hence the accelerating current of the train is halved), the substations which supply it can be twice as far apart as previously. However, twice as many half-length trains will be required to give the same service in seats per hour, so there will be four times as many trains per substation; there is thus a fourfold possibility that, for a given service, a density of at least one train per substation might be obtained. Moreover, the capacity of each substation can now be reduced, as the shorter trains require less current than the longer ones.

More generally, if train length is divided by x, substation spacing is multiplied by x; the number of trains is also multiplied by x, so the number of trains per substation is multiplied by x^2. The possibility of applying electrification economically to lightly-loaded lines is thus much increased by planning to operate a relatively frequent service of short trains.

This theme, in its simplest form, has been considered numerically for a

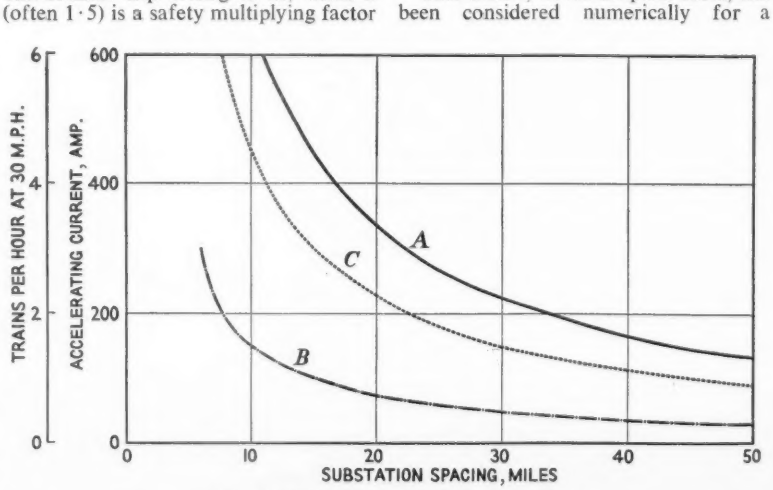


Fig. 2—Train currents and train flows

double-track 600-volt d.c. third-rail electrification with a single-track "go and return" resistance of 0·06 ohm per mile. The up and down tracks are assumed electrically independent, and the circuit breaker setting factor k is assumed to be 1·5.

Curve *A* of Fig. 2 shows the maximum possible accelerating current of a train on this installation, on a base of substation spacing in miles, and shows that currents of 200 or more amperes are possible for substation spacings as great as 30 miles.

Curve *B* shows the number of trains per hour which could be operated on each track with the suggested minimum of one train per substation, assuming an average operating speed of 30 m.p.h. It is seen that a two-hourly electric service seems reasonable of provision if substations can be 30 miles apart.

Curve *C* shows the train frequency which could be allowed with the same substation spacing but larger substation capacity (to be obtained at little extra cost). For this curve, three trains per substation have been allowed, since the up and down track circuit-breakers will each permit one train to accelerate and the factor k will permit up to 50 per cent more current to flow without a circuit-breaker tripping; it is a worthwhile risk to assume that all three trains will not attempt to accelerate at the same time. Moreover, interconnection of the negative conductors (the running rails), and probably also the positive conductor rails, would divide current flows more evenly and allow circuit-breaker trip setting to be somewhat increased; a maximum of three trains per substation, if its capacity suffices to carry their average load, is thus readily feasible.

It is thus seen from curve *C* that a service of three trains per hour each way may be obtained with substations as much as 15 miles apart. If shorter trains still were to be operated, an even more frequent service could be provided, but the total accelerating current of the trains on a section would not be able greatly to exceed that of the three maximum-length trains as given by curve *A*.

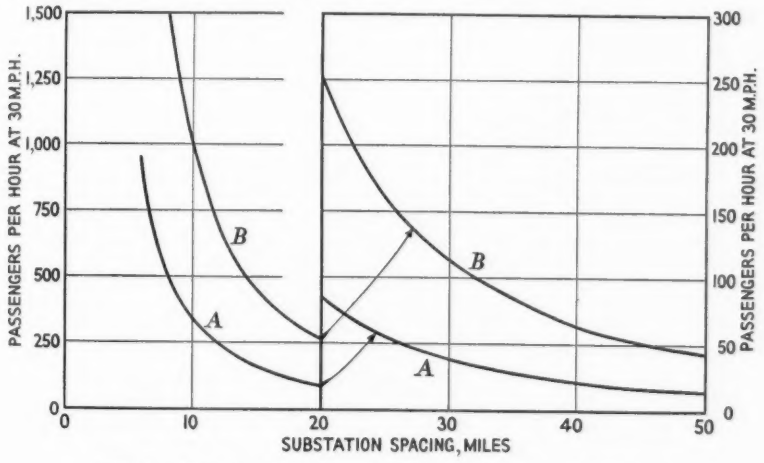


Fig. 3—Flow in passengers per hour at 3 amp. per passenger

Calculation of Traffic Capacity

The traffic capacity of such a line will be considered next. The farther apart are the substations, the smaller and less frequent are the trains which they can supply, hence the smaller the possible passenger flow even if the maximum number of trains per substation is operated. The writer finds that a rough estimate of the passenger capacity of a motor coach train is given by one-third of the accelerating current in amperes. The passenger capacity in each direction, given as curves *A* and *B* of Fig. 3, is thus one-third of the ampere-trains per hour which the substations, at the given spacings, can supply.

Curve *A* shows the minimum number of seats (or places) per hour which can reasonably be offered if there is but one train per substation; curve *B* shows the maximum number which can be offered, with three trains per substation. It will be seen that substations 30 miles apart can handle a range of flow from about 40 to 120 passengers per hour in each direction.

To increase the effectiveness of such a scheme of electrification would require the exercise of every possible economy. The substations should be small and unattended, of tramway type, with pumpless air-cooled mercury-arc rectifiers; their individual capacity for three trains per substation, at 30-mile spacing as in the above example, need only be 400 kW. for a minute and roughly 200kW. continuously. There would be no need for a separate railway H.T. electrical system; it is rarely, in the more populous areas in which these schemes would be suitable, that an industrial electrical feeder capable of supplying the requisite power would not be available adjacent to the railway at some suitable point. If the scheme were applied to the electrification of 10-mile spurs for railcar operation around certain large towns, one central substation would probably suffice.

The track would be electrified as simply as possible, by installing conductor rail and bonding the running rails. Electrification of crossovers and sidings would be omitted; in emergency, crossovers could be coasted over, and electrification of a selected few short sidings *en route* would suffice for stabling off-peak or failed vehicles. Conductor rail interconnection would be by cross connectors at stations, with hook switches so that single-line operation, after isolation of faulty lengths, could be arranged in emergency.

Proposed Types of Trains

The vehicles would be arranged to have a somewhat lower accelerating current than customary on (for instance) rapid-transit vehicles of similar size. A range of three types is suggested. The largest would be a two-car Southern-type train, carrying about 200, but with different equipment to give an accelerating current of no more than 600 amp. Next in size would be a twin railcar, or lightweight motor coach and control trailer, carrying about 100 and taking 300 amp. Finally would be a "railcoach" seating about 50, taking up to 150 amp. for acceleration.

The table below gives the approximate substation spacing, service frequencies at 30 m.p.h. for one and three trains per substation, and the corresponding passenger flows, for the three types of vehicle suggested:—

Type of train	Maximum substation spacing, miles	Trains per hr.		Passengers per hr.	
		1/Sub.	3/Sub.	1/Sub.	3/Sub.
2-car conventional ...	11	1·35	4·0	280	850
Twin railcar ...	22	0·7	2·1	70	210
Single railcoach	44	0·35	1·1	17	52

Operational advantages would follow from this scheme of electrification if ample substation capacity were installed, though it would be best to assume initially that the scheme would be sufficiently successful with only one train per substation. If the tracks were electrically interconnected, increase of the service to treble frequency, should the service prove attractive and passenger loads grow, would require only the provision of extra rolling stock. If loads should grow further, extra substations could be installed without reducing the ratio of trains per substation to less than unity; possibly, ultimately, a full-scale electrification might result. Alternatively, with interconnected tracks and ample substation capacity, a minimum service could be trebled at times of extra traffic, or, temporarily, more than trebled in one direction if correspondingly reduced in the other.

A further possibility would be to

(*Concluded on page* 99)

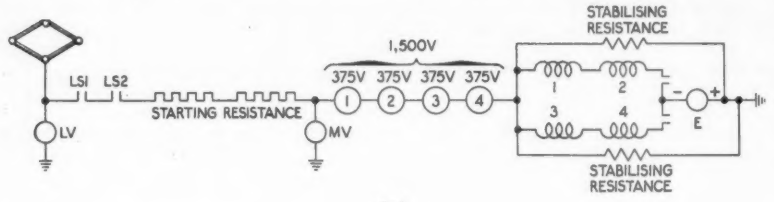
Training Motormen for Main-Line Electrification

Classroom syllabus and practical instruction on the Eastern Region

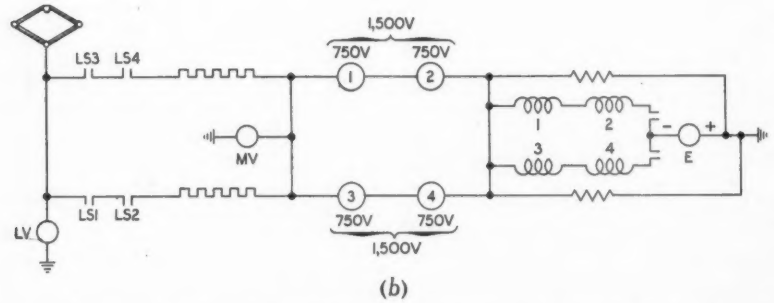
AN aspect of railway electrification that sometimes receives less notice than details of the equipment for new schemes, is the building up of a staff of qualified motormen and instructors. The training programme has to provide a technical background as well as practical instruction in preparation of locomotives for service, driving, recognition of common faults, and so on. These elements are inseparable, but there is room for variety in the emphasis placed on each. Preparation of the basic technical lectures at once raises the question of how far they should penetrate into electrical theory. At many points a lecturer is bound to ask himself whether he has treated fundamentals in enough detail for his argument to be followed, particularly when questions from the class raise issues he may have intended to avoid when planning his notes.

Practical experience of teaching and of trainees' reactions is the most satisfactory guide in these matters, and the present article describes the methods and results of the scheme in operation on the Eastern Region.

An outline of the sequence of instruction followed in training motormen for the first stage of the Eastern Region Manchester-Sheffield-Wath electrification was given in our February 22, 1952, issue. In October last a further stage was taken by completing the training of eleven motormen-instructors in preparation for the inauguration of electric working between Manchester and the western end of the Woodhead Tunnel. The training scheme, in planning and execution, rests on a basis of close co-operation between Mr. A. H. Emerson, Electric Traction Engineer, Manchester Electrified Lines, and Mr. A. R. Ewer, District Motive Power Superintendent, Doncaster. Its effectiveness was soon demonstrated by the very small number of failures among the 78 trainees of the first motormen's course, whose ages ranged from 43 to 63, and all of whom were volunteers from Mexborough Motive Power Depot with no previous experience of electric traction.



(a)



(b)

These diagrams of series (a) and parallel (b) braking connections in the Bo-Bo locomotives are representative of the way in which circuit arrangements are reduced to essentials for instructional purposes

Syllabus of Instruction

Training, normally spread over a month, begins with a week in the classroom. Courses are in charge of a Chief Instructor, supplied by the Electric Traction Engineer, assisted by six motormen-instructors, who were selected in January, 1951, from volunteers at Mexborough for training in these duties. The syllabus is in ten sections, covered in six hours' instruction a day, the first section being a general description of the scheme, its power supplies, substations, and the overhead system. Emphasis is given to the means of isolating sections of the contact line in case of a fault, by automatic operation of circuit-breakers at substations or track-sectioning cabins, by remote control from Penistone Control Station, or by operation of the lineside isolating switches by the motormen themselves with the keys they carry for this purpose.

A general description of the Bo-Bo locomotives follows. At this stage the purposes of starting resistances and series/parallel control are introduced, together with the effects of back e.m.f. and field-weakening, and the use of the traction motors as generators for regenerative braking. All these principles are explained in familiar and concrete terms, without mathematics. A glossary of technical words occurring in the lectures is planned similarly to provide definitions that can be understood readily by students having no previous background of electrical training. Its scope is widened beyond the common units and similar terms to clarify, for example, the differences in function and construction between a switch, a relay, and a circuit-breaker.

The importance of a grasp of such matters can be appreciated from the fact that experience with these courses has shown that in the early stages of instruction some trainees are confused by hearing of apparatus being operated by "closing" a circuit, because they associate the word with the shutting off of steam or air supplies.

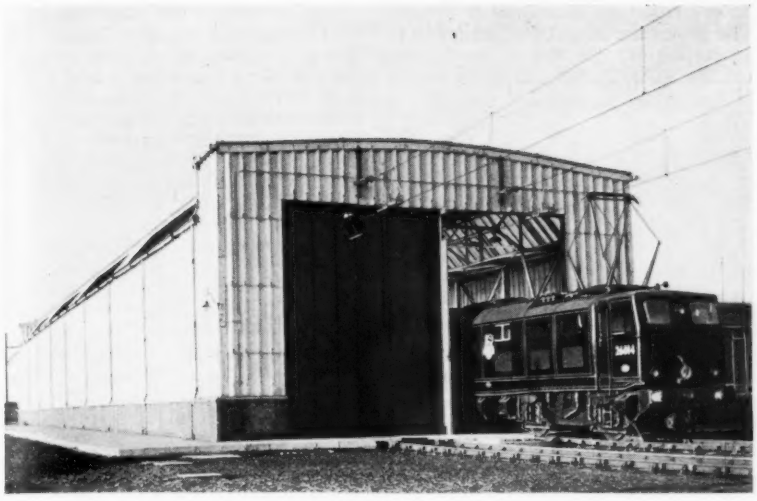
Motor Principle Explained

The lecture syllabus does not cover the electromagnetics of the motor principle, but deals concisely with the interrelation of speed, current, and tractive effort; for example:—

"When a motor is supplied with current it develops a tractive effort and will rotate. The tractive effort produced therefore depends on the currents in the field and armature; these are equal in the case of a motor on full field.

"The speed at which a motor will run depends on the voltage applied to it and the current. On a running notch the motor will run at a speed corresponding to the current required to produce sufficient tractive effort to overcome the train resistance. Thus the locomotive will automatically produce more tractive effort as it slows down and less as it speeds up."

Elsewhere the purpose of the inductive shunts in the field diversion circuits is explained as being to prevent a rush of current which might leave the motors with insufficient field strength. At this stage (Section 3 of the syllabus) the trainees are shown the 1,500 V. power circuit diagram of the locomotive and should be able to follow the two paths for the motor current when the field weakening contactors are closed. The point is one where a lecture syllabus planned on more theoretical lines might lead into the deep water of armature reaction and so on. Other lecturers might be tempted to ignore the inductive



One of the locomotives used between Wath and Dunford Bridge in the entrance to the motive power shed at Wath

shunts altogether and then find themselves forced into an unpremeditated explanation by a question from the class. The factual reason given in this syllabus is a well-judged middle course, capable of being elaborated if necessary.

Section 4 of the syllabus introduces the 50V. control circuits and describes the functions of the master controller levers. Section 5 deals with the construction and functions of the auxiliary machines and main traction motors. Regenerative braking, already described briefly in an earlier section, is treated in detail in Section 6. Trainees are told how varying the excitation of the traction motors enables the generated voltage to be balanced with that from the line, and how this state of affairs is shown on the line and motor voltmeters in the cab. The automatic changeover from regenerating to motoring in the regenerative connection, if a change in gradient tends to reduce the speed, is explained in the lecture.

A lengthy section, No. 7, is devoted to fuses, fuse failures and their effect, methods of testing fuses, location of equipment in the locomotive, faults, and general operating instructions. Trainees are taken over a locomotive in the shed during the classroom week, and also have a short ride to watch the manipulation of the controls, so that they have some practical background by the time this section of the syllabus is reached. A table is given of 41 faults, shown with symptom and cause on the following lines:—

Overload or over-volt relays trip while running—

(a) The line switch lamp will light and remain alight. Return accelerating and regenerating levers to OFF before re-setting, and control train. If either relay trips 3 times in quick succession, a fault condition should be assumed and rectified before proceeding.

(b) In the case of tripping the flags on the relays will indicate where the fault is and the appropriate pair of motors may be cut out.

(c) Overload trips may be due to a fault in traction motor circuit or to too rapid notching up on accelerating lever, exceeding the maximum notching value.

(d) Over-voltage trips may be due to faulty manipulation of the regenerating lever, or to a continued non-receptive line when in regeneration connections.

The three remaining sections of the syllabus deal with the brake equipment in general and with the vacuum and air systems in separate detail.

Circuit diagrams are used in the course of the lectures and are copied by trainees into their notebooks. The main power circuits are broken down into separate diagrams showing the arrangement of motors in series and parallel, the source of excitation and its control during regenerative braking, the two regenerative connections of the motors, and so on. An example of this type of schematic diagram is reproduced opposite. The motormen-instructors themselves have shown keen interest in producing simplified circuits of this type, enabling the various groupings of equipment to be seen at a glance without plodding through a contactor sequence chart.

The second week of the course brings the first opportunity for trainees to handle a locomotive themselves, short trips being made on sidings with the motormen-instructors. This is a most important part of the course, for it gives a chance of raising and rectifying occasional misconceptions that inevitably arise when so much new information has had to be assimilated in a short period of intensive training. In their practical work at this stage the trainees handle a light locomotive and gain experience in getting a train on the move, learning to use the first four controller notches to pick up the couplings without snatch. The second week concludes with the technical examination.

Driving Instruction

Trainees who pass this examination—and on the first course the high percentage of successes included one man within two years of retiring age—proceed to the working of trains on the main line.

At least thirty hours are spent under instruction on this stage, which covers the handling of locomotives on hauling and banking duties. Motormen now practice the whole procedure of notching up and transition, observing the notching current of 650 A. and the permitted maximum in parallel of 800 A. Journeys are made between Wath, or Elsecar Junction, and Dunford Bridge. On this section the 2¼ miles at 1 in 40 between Wentworth Junction and West Silkstone Junction are against westbound trains. Loads of 43 "heavies" are worked up the bank by two electric locomotives, one acting as banker in rear and being detached at West Silkstone to return on a descending train, assisting with regenerative braking.

The improved timings with electric traction on Stage 1 of the scheme are

Driving position of Bo-Bo locomotive, showing accelerating and motor combination handles in left-hand, and regeneration lever in right-hand quadrant

E3

shown in the following comparative table for various types of trains westbound:—

Class of train	C		E		F		HJK	
Steam (S) or Electric (E)	S	E	S	E	S	E	S	E
Section—	Min.	Min.	Min.	Min.	Min.	Min.	Min.	Min.
Elsecar Jc. to Adlam Jc.	4	5½	5	8½	7	9½	10	9
Adlam Jc. to Wombwell Main Jc.	3	3½	3	4½	3	4½	4	4½
Wombwell Main Jc. to Wentworth Jc.	14	9½	16	18	16	17	23	18
Wentworth Jc. to West Silkstone	10	6½	12	6½	12	6½	17	7½
West Silkstone to Barnsley Jc.	7	3½	8	3½	8	3½	10	3½
Barnsley Jc. to Dunford Bridge	16	15	22	16½	26	17½	32	18½

NOTE: Class "C" trains 100 per cent vacuum-fitted, average speed 50 m.p.h.; Class "E" 20 per cent (or unbraked), 35 m.p.h. (smaller load if unbraked); Class "F" unbraked, 30 m.p.h.; Class "H" unbraked, 25 m.p.h.; and Classes "J" and "K" unbraked, 20 m.p.h.

Practical experience with regeneration rapidly impresses trainees with the ease and certainty with which a train can be controlled by this form of braking. The procedure taught for beginning regeneration is: (1) Return accelerating handle to OFF and control train with air brake; (2) Select motor combination for speed required—series for 16-33 m.p.h. or parallel for 30-55 m.p.h.; (3) Manipulate regeneration handle until line and regenerated voltages are equal; and (4) Move accelerating lever to full-field notch, thus cutting out the starting resistances between the motors and the line. The train is then controlled with the regenerating handle, while watching the ammeters to see that the field current does not go up to twice the value of the armature current.

Motormen who have been through these courses and qualified retain in full measure the enthusiasm that led them to volunteer in the first place for work on electric locomotives. The results reflect also the keenness of the instructors, whose evident interest in the technicalities of their subject and the best methods of explaining them to their classes form a sure foundation for continued success as the training scheme proceeds.

Electric Motor Coaches for Switzerland

New single-phase vehicles of modern design for the Swiss Federal Railways

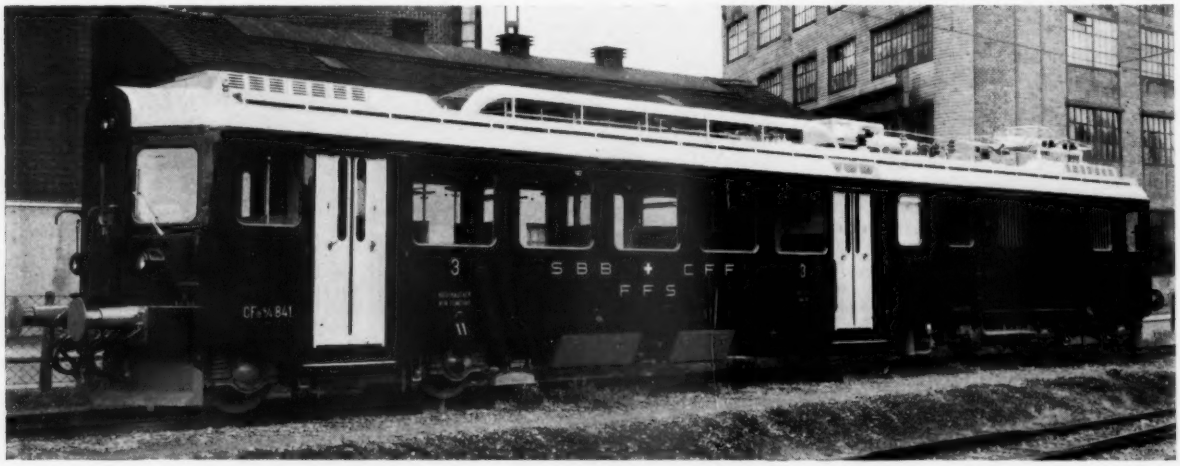
As a proportion of the total electric motive power, electric motor coaches have not hitherto been noticeable on the Swiss Federal Railways, even though the oldest of the few date back many years. But in May last the first of a new series of 28 was put into traffic on the Bellinzona-Locarno line, and others have since been delivered for trailer haulage in various locations.

Built by the Swiss Locomotive & Machine Works, they embody the latest practice in body framing and bogie construction, and have fully-springborne motors. By incorporation of recent progress in single-phase traction motor design, a high power output has been obtained. Each of the four axles is driven by a 400-h.p. (one-hour) motor, and the four produce a one-hour rail tractive effort of 6,100 kg. at 75 km.p.h. (13,500 lb. at 46½ m.p.h). Some of the motor coaches have motors driving through the Brown Boveri disc type of individual axle drive; the remainder have the Sécheron form of cardan drive with steel blade coupling. Supply of the electrical equipment was entrusted to Brown Boveri, Oerlikon, and Sécheron.

The starting tractive effort has been limited to 10,000 kg. (22,000 lb.), though the empty weight of the car is 55½ *tonnes*. Top designed speed is 100 km.p.h. (62 m.p.h.); and traffic requirements are the haulage of passenger coaches up to 250 *tonnes* trailing weight up 1·2 per cent (1 in 83) grades at 75 km.p.h. (46½ m.p.h.).

Each motor coach itself seats 44 third class passengers on upholstered seats, and has 19 sq. m. (204 sq. ft.) of luggage and parcels space; the luggage compartment is provided with a wide steel sliding door on each side. There is a driving compartment at each end. Coach length over buffers is 22·7 m. (74 ft. 6 in.), body width 2·92 m. (9 ft. 7 in.), and maximum width over steps 3·1 m. (10 ft. 2 in.).

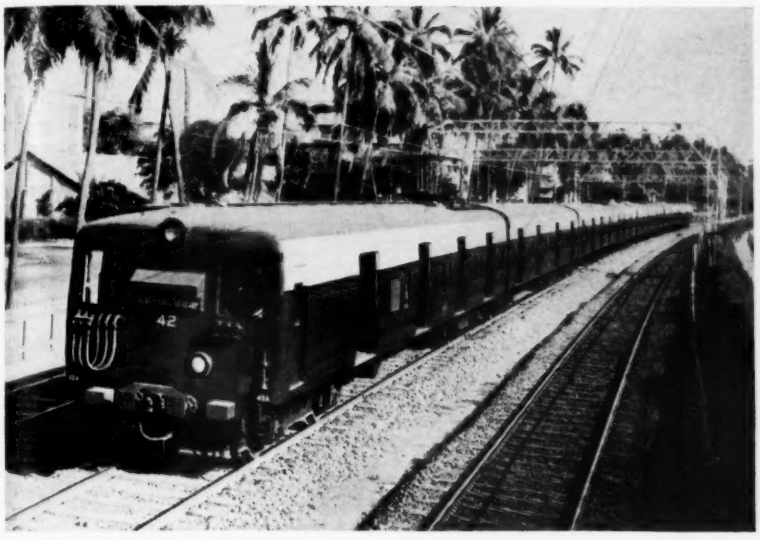
The motor coach bogies are of the type introduced some years ago by S.L.M. and applied with success to the Bo-Bo locomotives and latest passenger rolling stock of the Swiss Federal Railways. Bogie wheelbase is 2·8 m. (9 ft. 2 in.), and the pivot pitch 16·25 m. (53 ft. 5 in.).



One of the 28 motor coaches for the Bellinzona-Locarno line of the Swiss Federal Railways

Multiple-Unit Stock in India

Electrical equipment of Western Railway coaches



A train of the new stock in service on the Bombay suburban section of the Western Railway

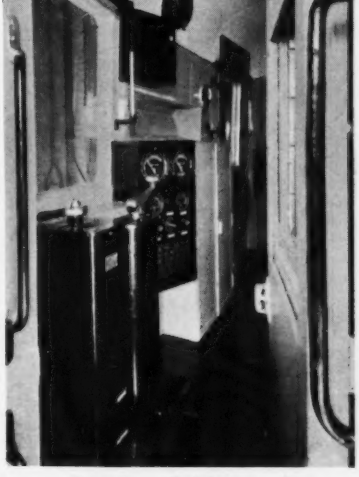
ELECTRICAL equipment for the twelve 4-coach units allocated to the Western Railway out of the 28 sets built in this country for India in 1951, was supplied by the British Thomson-Houston Co. Ltd. Constructional features of these lightweight vehicles were described in our April 27, May 11, May 25, and June 8, 1951 issues. The motor coaches were built by the Metropolitan-Cammell Carriage & Wagon Co. Ltd., and the trailers by the Birmingham Railway Carriage & Wagon Co. Ltd.

In the Western Region stock the four motors of each motor coach are controlled by a B.T.H. unit of the PCM type incorporating a camshaft for the resistance notching operated by an air-oil engine. This equipment, with the separate resistance frame, is mounted in the H.T. compartment behind the driver's cab. Severe flooding may occur during the monsoon season on the Bombay—Virar section where the trains operate, so that special provision has been made for low-speed running. This takes the form of two low-speed notches, the first placing an additional resistance in series with the normal starting group, and the second leaving only the starting resistances in circuit. Both notches can be used for continuous running.

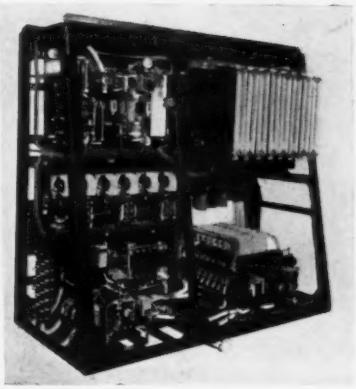
Automatic acceleration begins on notch 3 and provides eight resistance steps in series and nine in parallel, with three weak-field steps after full parallel. Weak-field is also introduced on the first slow-running notch, so that a cushioned start is provided in all circumstances, even when the controller handle is moved at once to series, parallel, or parallel weak-field.

The motors are axle-hung with resilient nose suspension. Their one-hour rating on full field at 700V. is 164 h.p., 195 amp., 1,075 r.p.m., With 82 per cent excitation at the same voltage a motor rates continuously at 150 h.p., 180 amp., 1,250 r.p.m.

Trains are made up of four-coach units consisting of two motor coaches with driving compartments and two trailers. Units can operate individually or in 8-coach or 12-coach trains. The motor-generator sets include an inductor alternator overhung on the L.T. end to give 210V. at 400 cycles for the fluorescent lighting of the coaches. J. Stone & Co. Ltd. was the contractor for the lighting installation, in which all lamps and control gear were obtained from B.T.H. The 78-cell Nife pattern batteries were supplied by Pritchett & Gold and E.P.S. Co. Ltd. Westinghouse Type CM38 compressors supply the braking and control services.



Interior of driving cab



PCM type camshaft control unit

Light-Load Electrification

(*Concluded from page* 95)

strengthen the trains when much traffic was expected: a minimum-frequency service of double-length trains could be run, or, if somewhat powerful railcars were normally operated singly, control trailers could be added at times of stress.

Even more scope is given for this electrification technique by the possibility of "incremental electrification" on the borders of existing electrified rail networks. Connecting branch lines at present worked by steam, or shorter spurs similarly operated, could be equipped with conductor rails fed through lightly-set circuit breakers, and operated by short trains or railcars. Certain through business trains from adjacent towns could continue operated by steam, as at present.

In this article technical possibilities of branch-line and other light-load electrifications for short train operation have been shown, and the consequent passenger flow limits given, the main theme being the reduction to a bare minimum of the number of substations required for a given route or scheme. It now remains for an economist to indicate where economic rather than technical considerations would limit application.

Moving the Neosho River Bridge on the Santa Fe Railway

An 800-ton span moved 50 ft. longitudinally and the bridge extended to accommodate flood water

The main span after being moved 50 ft. longitudinally from the old abutment at the extreme left

THE east abutment of a single 220-ft. span bridge carrying the Ottawa Junction-Emporia section of the Atchison, Topeka & Santa Fe Railway over the Neosho River was threatened by floods in July, 1951, which slightly altered the course of the river. The administration therefore decided to abandon the abutment and move the 800-ton span 50 ft. eastwards or longitudinally towards Ottawa Junction, and to provide for additional spill flood water by extending the bridge by four 50-ft. spans eastwards and one 50-ft. span westwards. Moving the main span enabled the new pier supporting it in its new position to be constructed well back from the main channel of the river. The original western abutment has been retained to support the landward end of the new western 50-ft. approach span, filling the gap made by movement eastwards of the main span.

Though the main problem was the movement of the 800-ton span, further careful planning was necessary in the construction of the four new eastern approach spans. The four piers carrying them and the eastern end of the main span after it had been moved are of concrete, and their foundations are on shale, about 50 ft. below rail level and well below the normal water table also.

Approach Spans

To enable these piers to be constructed, the existing approach embankment had to be cut away, and meanwhile traffic had to be carried on a temporary bridged approach. This consisted of the four wide-flange beam spans that were eventually to form the superstructure of the new permanent eastern approach. These spans were temporarily supported on double pile bents sited so that the new piers could be constructed between them.

The temporary span nearest to the main span ended midway between the new pier and old abutment of the main span, with its end carried by grillages resting on falsework, erected to support the east end of the 220-ft. span during the subsequent rolling to its new site. Two 25-ft. temporary single-line spans were therefore used to carry the two tracks across to the abutment until the main span was moved.

Construction of the New Piers

After the piles had been driven to carry the temporary 50-ft. approach spans, the top of the embankment was cut away and replaced by those spans. Excavation then proceeded for the piers between the pile bents and for the western pier. Steel cofferdams were used for the foundations with open excavation. As soon as the shale was reached, concrete was mixed on the river bank and pumped through pipes into the cofferdams, to form the pier foundations and later for the piers also.

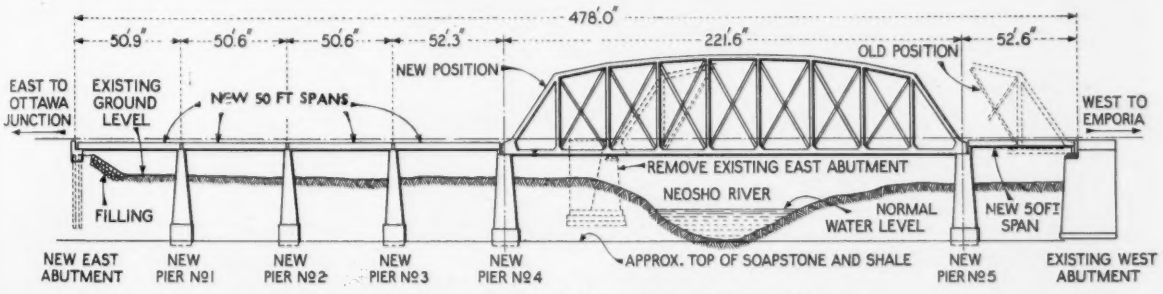
When all the piers had been completed and the time came for rolling the main span on to its new piers, the 25-ft. single-line spans and the nearest 50-ft. temporary span were quickly removed.

The falsework for supporting the main span when being rolled along consisted of four sets of longitudinal beams rest-

One of the bearings moving on a cluster of rollers under haulage by an elaborate system of blocks and cables

Moving the Neosho River Bridge on the Santa Fe Railway

The 200-ft., double-line, 800-ton span resting on the original abutments before being moved on to new piers, one of which is clearly seen



Main span in new position, showing also new approach spans

General view of the main span still on the abutments, the temporary 25-ft. span and the new eastern 50-ft. approach spans supported temporarily on pile bents

ing on pile bents, driven to shale and spaced at 10 ft. intervals, one set for carrying each bearing of the span. Cut pieces of sleeper were laid transversely on the beams with seven rails secured to them as a runway for a number of loose 1-in. rollers, passed in turn under the bearing as it advanced. To facilitate the placing of the rollers, a 1-in. plate with a slightly up-turned lip had previously been fitted under each bearing.

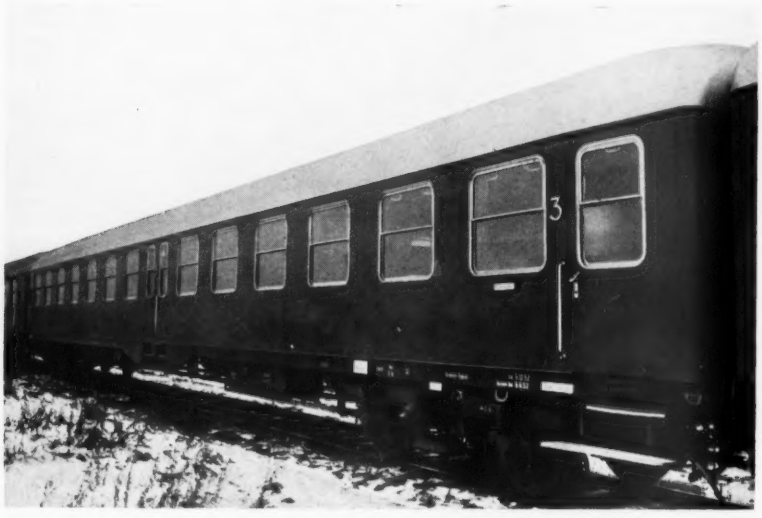
An elaborate block-and-tackle system was provided to ensure that the haulage movement would be smooth and steady; this is shown in one of the accompanying illustrations. Haulage power was supplied by the drum of a locomotive crane. The movement of the span was entirely successful. Initial frictional resistance was easily overcome and the 50-ft. travel was completed in 43 min.

Once the 220-ft. span had been jacked down on to its new pier bearings, it was only necessary to place the twin 25-ft. temporary spans and the new permanent western approach span in position, as run-offs from the main girder, to enable traffic to be resumed. Subsequently, the four eastern 50-ft. spans were moved forward from the pile bents to the new piers, and the 25-ft. spans were thus finally released.

The whole work, planned by Mr. T. A. Blair, Chief Engineer of the Santa Fe Railway, and under the direct supervision of Mr. F. D. Kinnie, Chief Engineer, Eastern Lines, was carried out by contract and completed without a hitch.

New Lightweight Stock, German Federal Railways

Unusually long coaches with second and third class accommodation, to run as set trains in fast schedules



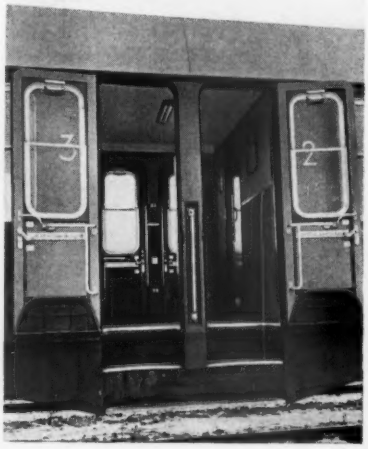
General view of new coach

THE German Federal Railways timetable of 1953-54 will show a considerable acceleration of numerous long-distance trains within Germany made possible by the introduction of lightweight steel coaches to be operated in new set trains designated "LS" (*leicht-Schnellzüge:* light fast trains). These sets will be worked on fast schedules mainly for second and third class business travellers.

In 1951 the Federal Railways placed orders with 15 West German manufacturers for 500 lightweight steel express coaches. Test runs with the first delivered having proved satisfactory, serial production is being put in hand. Delivery will be completed by the end of 1953.

The coaches are claimed to be the longest yet constructed, with an overall length of 26·4 m. (86 ft. 7½ in.). They have bogies of Minden-Deutz type giving excellent riding for speeds up to 75 m.p.h. by the incorporation of frictionless bolts and diagonally fitted oil-operated shock absorbers. This construction allows the vehicles to be worked some 125,000 miles without workshop inspection. Both second and third class type have end and centre vestibule and a new type of rubber corridor connection which is wider than the orthodox design, and gives good protection against dust and draught; it comprises simply a flexible rubber roll which is pressed against that of the adjacent coach without being fastened to it.

The accommodation includes upholstered seats in the third class, fluorescent tube lighting and double window-panes. Tail lamps are built in. The first of the order to be supplied will be semi-open, divided into saloons. The construction of another type with separate compartments and side corridor will begin later; this type might be used for international traffic also, as it would meet U.I.C. requirements.



(Left) Centre vestibule, and (right) third class saloon

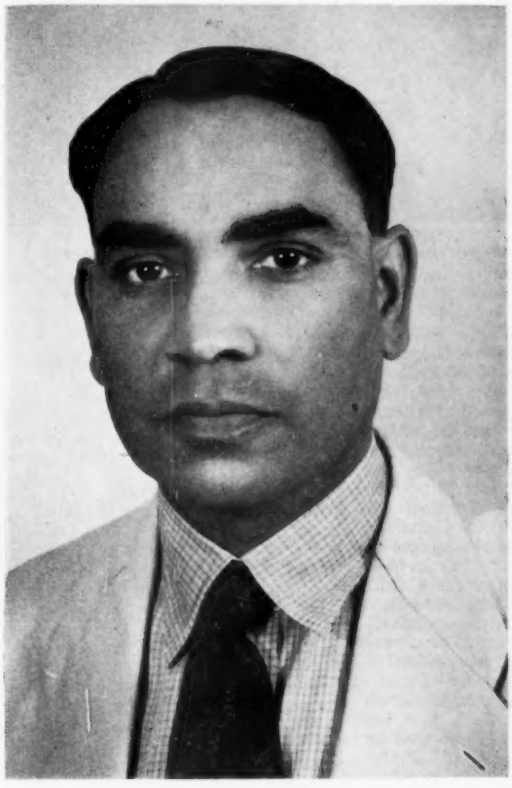
PROPOSED ISTANBUL UNDERGROUND.—The Istanbul municipality is studying a French scheme for an underground railway, estimated to cost £21,500,000. The proposed line would provide rapid transport between the Beyoglu and Fatih districts of Istanbul and relieve the present heavy tram and bus traffic using the Galata Bridge across the Golden Horn.

RAILWAY NEWS SECTION

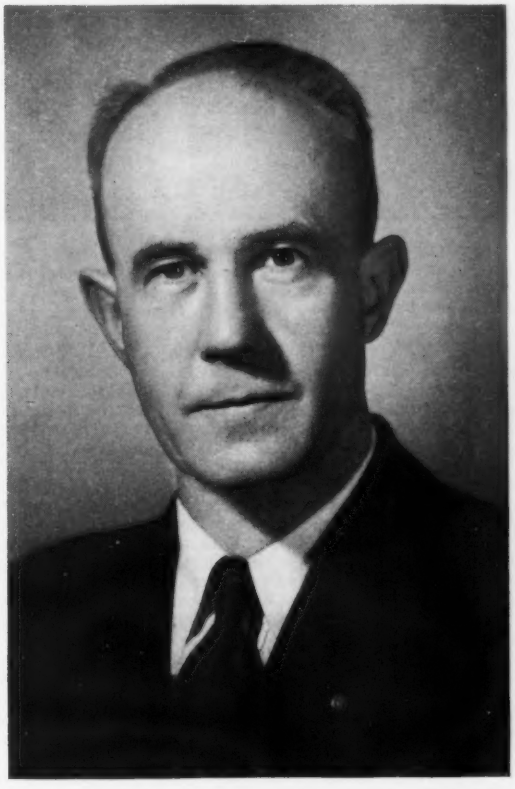
PERSONAL

Mr. D. Batliwala, Deputy Chief Mechanical Engineer, Southern Railway, India, has been appointed Acting Chief Mechanical Engineer consequent on the retirement of Mr. A. J. Baker.

Mr. Monindra Nath Chakravarti, M.Sc., who, as recorded in our May 23 issue, has been appointed Senior Deputy General Manager, Eastern Railway, India, was born on March 6, 1904. After having attended the Allahabad University he joined the former North Western Railway as a Probationary Assistant Transportation (Traffic) Officer. In December, 1936, he entered the Senior Scale and thereafter worked in various capacities as Divisional Transportation Officer, Divisional Commercial Officer, and Senior Assistant, Rates. While an Assistant Rates Officer he perfected the system of Rates Registers on the North Western Railway—a system which was extended to other railways later on. Early in 1943 Mr. Chakravarti was transferred to Karachi as Divisional Transportation Officer. In August, 1946, he became Superintendent, Walton Training School, Lahore Cantt. Two months later the Railway Board appointed him Officer on Special Duty in connection with the work of the Indian Railway Inquiry Committee whose Secretary he became in April, 1947. As Secretary of the Committee Mr. Chakravarti gained intimate knowledge of the various Departments of the Government Railways. On completion of this work he was appointed Officer on Special Duty (Railway Board) to progress the implementation of the various recommendations of the Committee, and he continued in this position until June, 1949, when he was appointed as Chief Director of Movement in the Ministry of Food & Agriculture. His services in rationalising all movements of food grains in the country, together with his assistance in the formulation of a basic plan for food distribution throughout India during the recent near-famine conditions have received high public appreciation. On July 6, 1952, Mr. Chakravarti was transferred from the Ministry of Food to the Eastern Railway as Senior Deputy General Manager, a new post, next to the General Manager, which was created after the inauguration of this regrouped railway on April 14, 1952.



Mr. M. N. Chakravarti
Appointed Senior Deputy General Manager, Eastern Railway, India



Mr. J. Loft
Appointed Chief Accountant, New Zealand Government Railways

A complimentary luncheon was given to Lt.-Colonel H. B. Everard at the Savoy Hotel on January 1 by members of the British Wood Preserving Association to mark his impending departure this month to take up the position of General Manager of the Rhodesian Railways. Colonel Everard for the past two years has represented British Railways on the Executive Committee. The Chair, was taken at the luncheon by the President, Major A. G. Saunders.

Mr. J. Loft, who, as announced in our November 28 issue, has been appointed Chief Accountant, New Zealand Government Railways, entered the railway service in 1915 as a cadet at Auckland. He served at various railway stations in the Auckland province until 1922, when he was posted to the District Traffic Manager's office at Wanganui, and in 1928 he became Stationmaster at Greytown. In the following year he was transferred to Greatford as Stationmaster, and from 1931 to 1937 was located at Wanganui, where he served both in the station and the district traffic office. Transferred to the Chief Accountant's office at Wellington in 1940, Mr. Loft at first undertook statistical work, but he later was engaged on special duties. In 1949 he became Inspecting Accountant, a position he held until last year, when he was appointed Revenue Accountant, from which post he has been promoted Chief Accountant.

Mr. A. A. Pryce, Works Manager, Islington Workshops, has been appointed Chief Mechanical Engineer of South Australian Railways in succession to Mr. F. H. Harrison, who resigned to become General Manager of Pascoe Industries Limited, Adelaide.

Mr. F. F. Santiago, Chief Accountant, Manila Railroad Company, has been appointed Acting General Manager in succession to Colonel Bautista, who has resigned.

Colonel W. P. Reed, O.B.E.

Appointed an Inspecting Officer of Railways, Ministry of Transport

Colonel R. J. Walker, O.B.E.

Inspecting Officer, Ministry of Transport, 1948-1953

Mr. J. McMaster

Appointed District Passenger Superintendent, Glasgow, Scottish Region

Colonel W. P. Reed, O.B.E., who, as announced in our January 16 issue, has been appointed an Inspecting Officer of Railways in the Ministry of Transport, is 49. He was commissioned in the Royal Engineers in 1923, and served in India as a Civil Engineer with the Great Indian Peninsula Railway from 1928 until 1939. Colonel Reed reverted to military service in 1939, and held various appointments, both Staff and Command, in the Military Transportation Service in the United Kingdom, India, and the Middle East until April, 1952, when he returned home to an appointment with the Transportation Directorate, War Office. He has retired from the Army to take up his present appointment.

Colonel R. J. Walker, O.B.E., who, as recorded in our January 16 issue, resigned on October 31, 1952, as an Inspecting Officer of Railways in the Ministry of Transport, was commissioned in the Royal Engineers in 1923. After a period of service in England, he was posted to Malaya in 1927, and in 1929 he was attached to the British Embassy to Japan. During this period he served with an Engineer Battalion of the Japanese Army, and later the School of Mechanical Transport in Tokyo. In 1932 he went to China, on Garrison and Fortress engineering duties. Returning to the United Kingdom in 1934, he was appointed Assistant to the C.R.E., Northern Ireland. In 1936, he was posted as Adjutant to the Railway Training Centre, Longmoor, where he was still serving at the outbreak of war, when he became Assistant Commandant. Colonel Walker was appointed at the end of 1940 as D.A.Q.M.G. (Movements), and served at Salisbury and in Scotland. In 1941 he went to Northern Ireland as A.Q.M.G.(M.), where he was in charge of military rail, road and sea movement. In 1943 he was in charge of Movements in South Eastern Command, where preparations for the invasion of Normandy were in progress, and at the end of the year he went for special duties to the American Headquarters, E.T.O., U.S.A. In January, 1944, Colonel Walker was appointed a Deputy-Director of Personnel Movements at the War Office, and was responsible for all military personnel movements by rail in the United Kingdom and by sea to the Continent and other places served by short sea routes. In 1946 he left the War Office, and he was later seconded for a year, through the Foreign Office, to the Venezuelan Government as its Transportation & Railway Adviser. He went to Venezuela in 1947, and, after an extended study of the transport system of the country, duly reported and advised on it, with particular reference

Mr. J. C. Way

Appointed Sales Manager, Traction Department, Metropolitan-Vickers Electrical Co. Ltd.

The late Mr. J. Lees

Chief Assistant Superintendent, Western Section, Southern Area, L.N.E.R., 1927-1941

Mr. A. E. Grimsdale

Appointed Special Assistant, Sales Management, Metropolitan-Vickers Electrical Co. Ltd.

to the economic and technical aspects of the railways. He returned home in 1948, and, retiring from the Active List of the Army, accepted the appointment of Inspecting Officer for Railways with the Ministry of Transport from which he has now resigned in order to join Tanganyika Concessions Limited as Railway Adviser. He is shortly going for several months to Central and South Africa.

Mr. J. McMaster, Assistant to Commercial Superintendent (Passenger), Scottish Region, British Railways, who, as recorded in our January 9 issue, has been appointed District Passenger Superintendent, Glasgow, entered the service of the Caledonian Railway in 1909 as a messenger lad in the office of the General Superintendent, and graduated from that stage through the Statistical, Goods & Mineral, Train Working, and Passenger Rates & Fares Section to the General Manager's Office in 1915. During World War 1, he served with the Royal Engineers. On demobilisation he returned to his former post and, in 1927, on the re-organisation of the then Deputy General Manager's Office for Scotland (L.M.S.R.), was transferred to the Rates & Fares Section in the Passenger Commercial Superintendent's Office, L.M.S., Northern Division. In 1942 Mr. McMaster took charge of the Rates & Fares Ticket Section, and in 1943 he was appointed Chief Clerk, Rates & Fares Section. In 1946 Mr. McMaster became Passenger Train Rates & Fares Assistant, Commercial Superintendent's Office, for the Northern Division, L.M.S.R., and, in 1949, assumed similar responsibilities for the Scottish Region, British Railways. Later in the same year he was appointed Assistant to Commercial Superintendent (Passenger) Scottish Region. As Rates & Fares Assistant Mr. McMaster was a member of the Passenger Train Rates & Fares Conference, and as Passenger Assistant, he was a member of the Estimates Committee of Principal Passenger Assistants dealing with the British Transport Commission (Passenger) Charges Scheme, 1952.

Mr. J. Lees, formerly Chief Assistant Superintendent, Western Section, Southern Area, L.N.E.R., who, as recorded in our January 9 issue, died on January 4, entered the service of the Great Central (then the Manchester, Sheffield & Lincolnshire) Railway Company in 1891 as an apprentice in the office of the Superintendent of the Line. In 1903 he was appointed Chief Clerk to the Superintendent of the Line, Great Central Railway, and in 1912 was promoted to the position of Assistant District Superintendent & Goods Manager Grimsby Docks. In 1919 he was appointed District Traffic Manager at Immingham. On amalgamation in January, 1923, he was made Assistant Superintendent, G.C. Section, London & North Eastern Railway, and in September, 1927, was appointed Chief Assistant Superintendent, Western Section, Southern Area, from which position he retired in 1941.

Mr. A. E. Grimsdale, B.Sc., who, as recorded briefly in our January 16 issue, has been appointed Special Assistant, Sales Management, Metropolitan-Vickers Electrical Co. Ltd., took his degree from Brighton Technical College, and joined Metropolitan-Vickers as a College Apprentice in 1922 after spending three years as Technical Engineer in the company's Sydney (Australia) office, and a further two years in the Traction Control Department at Trafford Park. He transferred to the Traction Sales Department in 1932. From 1941-45 he was Assistant to the Works Manager at the company's Sheffield Works, being concerned with the wartime production of rotating electrical machines for service contracts. At the end of the war he became Deputy Sales Manager, Traction Department, and, in 1946, he was appointed Manager, Traction Sales.

Mr. J. C. Way, A.M.I.E.E., A.M.I.Loco.E., who, as recorded briefly in our January 16 issue, has been appointed Sales Manager, Traction Department, Metropolitan-Vickers Electrical Co. Ltd., joined the company in 1923 as a College Apprentice. After a period in the Traction Motor Drawing Office, Mr. Way joined the Traction Motor Engineering Department at the company's Sheffield Works. During the war, he was engaged on special duties in connection with service contracts, after which he was appointed Assistant to Manager, Sheffield Works. In 1947 he moved to Trafford Park, becoming Senior Sales Engineer in the Traction Sales Department, and, two years later, he joined the Metropolitan-Vickers Traction Bureau in London. In 1951, he was appointed Assistant to Manager, Traction Sales .

The New Zealand Government has set up a Railways Management Commission which will be responsible for the management and administration of the railways, the Government retaining control of railway policy and capital development while remaining open to recommendations relating to such policy arising from investigations conducted by the Commission.

The Governor-General, Sir Willoughby Norrie, has approved the appointments of the following as Directors on the Commission:—Messrs. C. H. Bray, Transportation Superintendent, New Zealand Railways, A. T. Gandell, Investigating Engineer, Railways Department, W. E. Hodges, Manager, Commercial Branch, Railways Department, R. Martin, Company Director, and W. L. Wyber, Bank Manager, Auckland.

The immediate concentration of the Commission will be on finance, the working of the wharves at railway ports and branch lines.

We regret to record the death on January 14, at the age of 60, of Mr. Harold Scarffe, Travelling Passenger Agent in London for the Canadian Pacific Railway.

Mr. D. W. Johnston, General Freight Agent, Rates & Divisions, Canadian Pacific Railway, will retire on pension at the end of the year.

A Transport & Communications Commission will be set up within the French Planning Board. This Commission is to consist of three sections dealing with inland transport, merchant shipping and maritime ports, and civil aviation respectively. The first of these sections will comprise various working groups covering the study of problems arising from the modernisation of the railways, roads, urban transport and inland waterways. Mr. Surleau, Conseiller d'Etat, has been appointed Chairman of the Commission, and the following are among the proposed members:—

Messieurs Armand, General Manager, French National Railways; Devillers, General Manager, Paris Transport Authority; Debruel, Chairman & Managing Director, Societe Citerna; Gallienne, Chairman, Union Routiere; Gaspard, General Manager, Electricite de France; Porchez, Assistant General Manager, French National Railways; Renard, Chairman, Federation Nationale des Transports Routiers; Peltier, Director, Department of Ports & Inland Waterways, Ministry of Merchant Shipping, Picard, Chairman, Association Technique de l'Importation Charbonniere.

We regret to record the death, on January 18, of Major F. C. Wilson, R.E., formerly Stores Superintendent, South Indian Railway.

We regret to record the death on January 14 of Mr. W. J. Watters, formerly District Electrical Engineer, East Indian Railway.

Dr. A. W. C. Bennett has retired as Medical Officer to the former Great Western Railway and the Western Region, British Railways.

Mr. H. R. Statham has retired as District Passenger Superintendent, Glasgow, Scottish Region, British Railways.

A lunch was given to Mr. R. H. Dobson by the Rede Ferroviaria do Nordeste at the Connaught Rooms on Friday, January 16. Mr. Dobson was recently co-opted as a railway expert by the Mixted Brazilian-U.S.A. Commission to advise on the requirements of the Railways of Brazil under the Truman Point 4 Programme. The following were among those present:—

Messrs. Lennox Alexander, W. Andrew, A. R. Bent, H. F. Bibby, Colonel K. Cantlie, Messrs. D. G. Clarke, F. Ellis, I. H. C. Gilbert, M. D. Lowndes, L. W. H. Lowther, F. Mason, V. M. Marshall, R. Mayhew, N. Morris, R. S. Nosworthy, S. Potter, R. Powell, F. E. Sheppard, D. Thoms, W. L. Topham, A. J. Walter, J. C. Way, H. White, and W. Cyril Williams.

Captain Jesse Hughes, of British Railways (London Midland Region) Cross-Channel vessel r.m.s. *Cambria*, has now completed his last voyage between Holyhead and Dun Laoghaire before going into retirement after 50 years at sea.

Mr. E. B. Hinchliffe, Stationmaster, Kensington (Olympia), British Railways, Western Region, has retired after 45 years' service.

At a meeting of the Traders' Co-ordinating Committee on Transport held on January 14, Mr. M. F. Barnard, M.Inst.T., was re-elected Chairman, and Mr. L. G. Burleigh, M.Inst.T., Vice-Chairman, for 1953.

We regret to announce the death of Mr. E. J. M. Donald, who was in charge of the Railway Materials Department, Stahlunion Co. Ltd. As a temporary measure, all business concerning the Railway Materials Department will be dealt with by Mr. H. E. Potter.

We regret to record the death on January 7 of Mr. R. Beavan, formerly London Representative of the Railway Signal Co. Ltd., Mr. R. Beavan, who as recorded in our September 19, 1952, issue, retired as London Representative of the Railway Signal Co. Ltd. on August 31 last after 55 years service with that company, joined the Fazakerley Works in 1897, and was transferred to London in 1908. Mr. Beavan was for many years Chief Draughtsman to the company, and, after re-organisation involving transfer of the drawing office to Liverpool, he was responsible for the London sales side of the business to the time of his retirement. He is succeeded by Mr. E. J. Beavan.

British Transport Commission Statistics. (Period No. 12)

Summary of the principal statistics for the four-week period ending November 30

STAFF

—	B.T.C. Head Office	British Railways	London Transport	British Road Services (Road Haulage)	Road Passenger (Provincial & Scottish)	Hotels & Catering	Ships & Marine	Inland Waterways	Docks, Harbours, Wharves	Railway Clearing House	Commercial Advertisement	Legal	Films	Total
Number	284	602,462	97,398	72,978	61,182	15,390	6,196	4,773	20,840	569	199	322	39	882,632
Inc. or dec.	−2	−1,644	−427	−447	−118	−149	−32	+5	+40	−4	−2	+3	+1	−2,776

BRITISH TRANSPORT COMMISSION TRAFFIC RECEIPTS

—	Four weeks (Period No. 12)		Aggregate for 48 weeks	
	1952	1951	1952	1951
	£000	£000	£000	£000
British Railways—				
Passengers	6,472	6,207	101,571	98,833
Parcels, etc., by passenger train	2,821	2,622	32,864	30,471
Merchandise	8,348	8,362	94,605	90,579
Minerals	3,548	3,238	38,653	33,647
Coal & coke	8,247	7,646	93,096	84,230
Livestock	196	177	1,772	1,446
	29,632	28,252	362,561	339,206
British Railways— C. & D. and other road services	902	854	10,513	9,754
Ships and Vessels	570	620	10,862	11,170
London Transport—				
Railways	1,425	1,232	16,538	14,829
Buses & coaches	2,980	2,604	36,278	31,121
Trolleybuses	705	715	8,771	8,919
	5,110	4,551	61,587	54,869
British Road Services— Freight charges, etc.	6,100	6,587	70,749	71,799
Road Passenger Transport	3,215	2,970	44,256	40,296
Docks, Harbours & Wharves	1,163	1,172	14,759	13,018
Inland Waterways	172	159	2,055	1,836
Hotels & Catering	1,171	1,154	15,033	14,821
Total	48,035	46,319	592,375	556,769

LONDON TRANSPORT

—	Passenger journeys	Inc. or dec. per cent. over 1951	Car miles	Inc. or dec. per cent. over 1951
	000		000	
Railways	46,370	− 3·6	16,352	− 5·3
Buses & coaches	223,688	− 2·1	26,930	+ 3·1
Trolleybuses	58,425	−17·7	5,779	−17·2
Total	328,483	− 5·5	49,061	− 2·6

INLAND WATERWAYS

Tonnage of traffic and ton miles

—	Tonnage	Inc. or dec. per cent. over 1951	Ton miles	Inc. or dec. per cent. over 1951
	000		000	
Coal, coke, patent fuel & peat	506	+ 6·5	6,966	+ 0·4
Liquids in bulk	163	− 6·8	4,029	− 8·8
General merchandise	303	− 9·5	5,257	− 0·2
Total	972	− 1·3	16,252	− 2·3

BRITISH RAILWAYS

Rolling Stock Position

—	Operating stock	Number under repair	Available operating stock	Serviceable stock in 1951
Locomotives	18,669	3,221	15,448	15,575
Coaching vehicles	57,621	5,518	52,103	52,610
Freight wagons	1,120,382	84,116	1,036,266	1,049,296

BRITISH RAILWAYS

Passenger journeys (Month of October, 1952)

Full fares	Excursions, cheap day, etc.	Other descriptions	Early morning and workmen	Season tickets	Total	Inc. or dec. per cent. over 1951
16,666,000	18,786,000	3,388,000	17,617,000	21,261,000	77,718,000	− 5·9

BRITISH RAILWAYS

Freight Tonnage Originating and Estimated Ton-Miles (Period No. 12)

—	Merchandise	Minerals	Coal & coke	Livestock	Total	Inc. or dec. per cent. over 1951
	000	000	000	000	000	
Tons originating	3,963	5,267	13,852	77	23,159	− 0·8
Ton-miles	549,865*	420,154	829,628	—	1,799,647	− 5·0

* Includes livestock

BRITISH RAILWAYS (Period No. 12)

—	Total steam coaching train-miles	Total electric coaching train-miles	Total freight train-miles	Freight train-miles per train engine-hour	Net ton-miles per total engine-hour	Locomotive coal consumption	
						Total tons	lb. per engine-mile
1952	13,583,000	3,722,000	11,224,000	8·4	605	1,042,000	63·6
1951	13,404,000	3,744,000	11,544,000	8·2	609	1,059,000	63·4

Ministry of Transport Accident Report

Clydebank, January 21, 1952: *British Railways, Scottish Region*

Colonel R. J. Walker, Inspecting Officer of Railways, Ministry of Transport, inquired into the accident which occurred at 7.56 a.m. on January 21, 1952, at Clydebank station, when the 6.50 a.m. train, Rutherglen to Dalmuir, consisting of 7 coaches drawn by 2-6-4 class "4" tank engine No. 42712, travelling at 15 m.p.h., ran into the 6.40 a.m. train, Rutherglen to Old Kilpatrick, consisting of 6 coaches, standing in the station. The engine of the colliding train sustained minor damage; in the other train telescoping occurred between the fifth and sixth vehicles. Twenty passengers complained of slight injury and three elected to go to hospital but were not detained. Day was just breaking and the weather was frosty and foggy, with visibility reduced to 20 or 30 yd. Rail surfaces were greasy. The accompanying diagram shows the lines, the main line, nor where a rail contact is provided, until the train has reached the contact. At junctions when a train has been brought to a stand ahead of the junction the train out of section signal must not be given until the facing points have been set for another line and that line is clear.

There is also a local instruction exhibited in the No. 1 signal box reading as follows:—

Regulation 4(*e*)

"When Clydebank No. 2 box is open, before the fog signalman is on duty at the down distant signal the is line clear signal for a train on the down main line must not be acknowledged until it has been passed forward to and acknowledged by repetition by the box in advance."

Trains were running late and the standing train had been held some 9 min. awaiting "line clear." There was a fog signalman at the Yoker up distant signal, under the signal giving admission to the block section, situated 110 yd. from No. 1 box down home. There were no others in the vicinity.

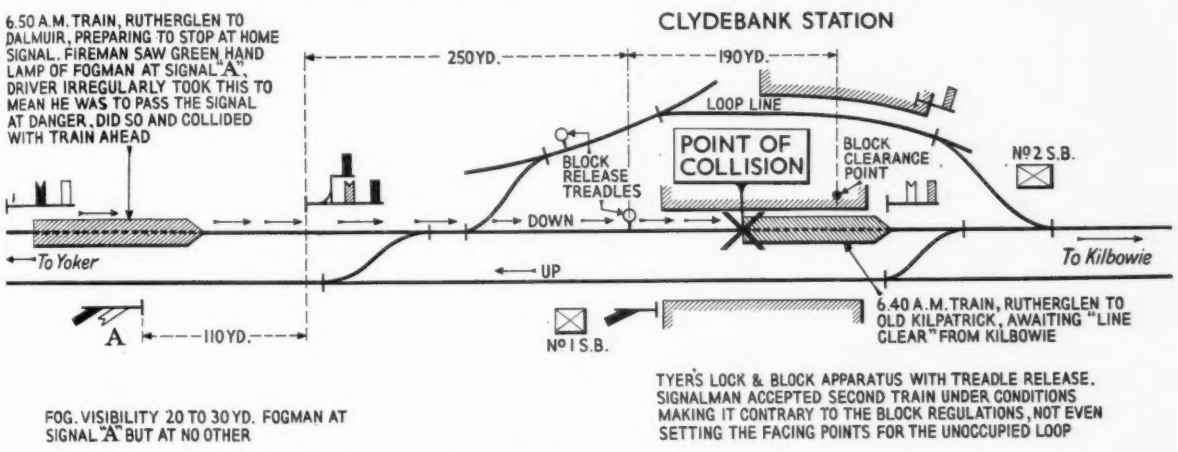

6.50 A.M. TRAIN, RUTHERGLEN TO DALMUIR, PREPARING TO STOP AT HOME SIGNAL. FIREMAN SAW GREEN HAND LAMP OF FOGMAN AT SIGNAL "A", DRIVER IRREGULARLY TOOK THIS TO MEAN HE WAS TO PASS THE SIGNAL AT DANGER. DID SO AND COLLIDED WITH TRAIN AHEAD
CLYDEBANK STATION
250YD.
190YD.
LOOP LINE
POINT OF COLLISION
BLOCK CLEARANCE POINT
BLOCK RELEASE TREADLES
No 2 S.B.
DOWN
To Yoker
UP
To Kilbowie
A
110YD.
No 1 S.B.
6.40 A.M. TRAIN, RUTHERGLEN TO OLD KILPATRICK, AWAITING "LINE CLEAR" FROM KILBOWIE
FOG. VISIBILITY 20 TO 30 YD. FOGMAN AT SIGNAL "A" BUT AT NO OTHER
TYER'S LOCK & BLOCK APPARATUS WITH TREADLE RELEASE. SIGNALMAN ACCEPTED SECOND TRAIN UNDER CONDITIONS MAKING IT CONTRARY TO THE BLOCK REGULATIONS, NOT EVEN SETTING THE FACING POINTS FOR THE UNOCCUPIED LOOP

Diagram showing circumstances of the accident at Clydebank, January 21, 1952

Evidence

The signalman in No. 1 box was 21 and had been one since 1948. He said that when the first train arrived at 7.47, although it stood within the 440 yd. clearance laid down and he had neither pulled over the loop points to give the necessary clearance in an unoccupied line, nor asked and obtained "line clear," in accordance with fog block regulations, he accepted the Dalmuir train. He admitted to doing this before and knowing it was wrong. The fog had been thick since 6.20, when he came on duty, and he knew he should have called out the fogmen and, until their arrival, have applied the fog block regulations, but he did neither. He kept his signals against the second train.

A lengthman said that, seeing the weather conditions, he came on duty of his own accord at 6.0, to salt points and keep them free and to take up fog signalling duties. At about 7.25 he took up his position close to Yoker distant signal. When it changed to clear he walked back with his hand lamp at green to pick up the detonators; the second down train passed him while he was doing so. By the time he returned with the lamp showing towards Yoker it had passed completely.

The driver of the Dalmuir train said he had practically stopped at the approach to the home signal when his fireman, on the right-hand side, said he had seen a man exhibiting a green hand lamp. He did not see this himself, but concluded that the signal must be defective and he was intended to pass it at danger. He continued slowly on, to save time, expecting further information at the station. He caught sight of the tail lamp ahead at 20 yd. and made a full brake application.

Inspecting Officer's Conclusion

This accident was caused by the combined mistakes of the signalman and driver. The former was not a good witness. His evidence was vague and unsatisfactory; it appeared from it that his understanding of his duties was remarkably indistinct, but Colonel Walker is not prepared to accept his evidence at face value. He thinks he was conversant with his duties, even if not fully understanding the reason for them, and that his action and omissions were simply due to carelessness. He has now been relegated to other duties.

The driver had been one for five years and was 51. His passing the home signal is difficult to understand. Although the ignorance expressed by the signalman was exaggerated, Colonel Walker thinks there was some genuine confusion in his mind about the purpose of the treadle and its relation to the 440 yd. clearance. He may have come to regard them as alternatives. Any confusion in this respect would not, Colonel Walker considers, be removed by the somewhat complicated wording of the regulations quoted above. Unless carefully read, it might even be taken to confirm his misapprehension.

The importance of wording instructions and regulations so that they have but one meaning and can clearly and easily be understood by those who have to put them into effect, is obvious. Doubtless the authorities have this well in mind, and when such confusing words come to light they will be suitably altered.

signals, and so on essential to an understanding of the case.

Lock-and-block is in operation, with a modified form of Tyer's former Caledonian Railway type semaphore indicator instruments, with treadle release, and the following instructions are in force:—

4. *Line clear or giving permission for a train to approach* (*first paragraph of clause* (*a*) *modified*):—

(*a*) Except where special instructions are issued to the contrary, the line must not be considered clear, nor must a train be allowed to approach from the box in rear, in accordance with Regulation 3, until the preceding train has passed over the rail contact (where provided) or at least a quarter of a mile beyond the home signal, nor until all the points necessary for the safety of the approaching train have been placed in their proper position, and the line is clear for at least a quarter of a mile ahead of the home signal.

10. *Train out of Section* (*Clause* (*a*) *modified*):—

(*a*) Except where special instructions are issued to the contrary, trains must not be considered out of section and the train out of section signal must not be sent until the train with tail lamp attached has passed at least a quarter of a mile beyond the home signal or has been shunted clear of

The Electric Traction Industry in 1953

Orders completed and in hand

Reviews of activities during the past year by manufacturers of electric traction and associated equipment show that a sustained demand for standard products has been met, while the continuing processes of development have brought to the production stage new apparatus of growing interest for the future.

The British Thomson-Houston Co. Ltd. is supplying a 20,000 kW., 50-cycle alternator to the London Transport Executive for Greenwich power station. During the year the company has been engaged on electro-pneumatic camshaft control equipments, similar to the type it has supplied for all London Transport trains since 1938, which will be installed in 104 motor coaches for the Toronto subway. An installation of pumpless steel tank rectifiers, smoothing apparatus, and d.c. motors is being supplied for a motor coach to be used in the trials of 50-cycle traction equipment now in progress on the L.M.R. Lancaster-Morecambe-Heysham line.

Activity has continued in the diesel-electric field. An additional eight equipments were ordered for the Ruston 165-h.p. shunters, also two 275-h.p., and two 400-h.p. power sets for the Yorkshire Engine Company's steelworks shunters. Work has gone ahead on the 10 1,000-h.p. diesel-electric locomotives for the New South Wales Government Railways and the 18 400-h.p. diesel-electric shunters for the Western Australian Government Railways. Units of each size are expected to be on trial early this year.

The special B.T.H. traction resistor, type RP, has been in demand and delivery has begun on the order for 26 sets for locomotives for the Victorian Government Railways, Australia. One order received during the year was for 43 sets of resistors for 3,000-volt locomotives for the Spanish National Railways. Orders have been received for two of the special ZP high-capacity loading resistors for testing the generators of diesel-electric locomotives.

The Brush Electrical Engineering Co. Ltd. has successfully completed during the year in its Turbine Division the Ljungström modernisation programme begun five years earlier. In this period, 22 machines, the majority of them owned by the British Electricity Authority, ranging between 15 and 50 MW., have been re-equipped with a blade system of the most modern design, and the operation of these machines has fully justified the decision taken in 1947 to proceed with the modernisation. Alongside this considerable task, there has been a steadily increasing flow of normal production.

The Switchgear Division of the factory continues to expand and through its rapid growth, further factory space has been allocated to the building and development of switchgear. An important development during the year was the P.H.K. 35 closing mechanism, to which the company's associate, Bryce Berger Equipment Limited, has contributed. In the Rotating Machines Division of the company, there has been considerable re-organisation of testing facilities, and two new test areas, one to deal with the largest engine-driven alternators and the other to serve d.c. machines, including traction generators and motors, have been laid out.

The English Electric Co. Ltd. during 1952 received orders for electric locomotives including 2,000 h.p., 3,000-volt d.c. locomotives for the South African Railways, further 3,600 h.p., 3,000-volt d.c. locomotives for the Spanish National Railways (for which locomotives mechanical parts are being made by the Vulcan Foundry Limited) and flameproof battery locomotives for the National Coal Board. Other orders include one from the Victorian Government Railways for traction motors and control equipment for 750-h.p. 1,500-volt d.c. motor coaches.

Deliveries made during the year included motor coach sets for British Railways, Southern Region; complete 800-h.p. 3,000-volt d.c. three-coach trains for Estrada de Ferro Santos a Jundiai (Brazil); and 3,600-h.p. 3,000-volt d.c. locomotives for the Spanish National Railways. The first English Electric flameproof battery locomotives for use in gaseous mines were delivered to the National Coal Board.

Diesel-electric traction orders received during 1952 include 400-h.p. power equipments for shunting locomotives for British Railways, who will build the mechanical parts; 750-h.p. mixed traffic locomotives for the Gold Coast Government Railway; 400-h.p. shunting locomotives for the Netherlands Railways; 1,500-h.p. mixed traffic locomotives for the Parana-Santa Catarina Railway (Brazil), and 2,000-h.p. mixed traffic locomotives for the Rhodesia Railways.

Deliveries during 1952 included further 400-h.p. power equipment for shunting locomotives. Diesel-electric locomotives and rolling stock delivered during the year included 400-h.p. locomotives for Imperial Chemical Industries Limited, 400-h.p. shunting locomotives for the Netherlands Railways, and 800-h.p. five-coach suburban trains for the Egyptian State Railways (for which the mechanical parts and coachwork were built by the Birmingham Railway Carriage & Wagon Co. Ltd.

The General Electric Co. Ltd. has numbered among its transformer contracts an order for two 1,200 kW. rectifier transformers for the Estoril Railway, Lisbon, now on site. One of these has its primary winding connected in star while that of the second unit is connected in delta, so that by connecting the two together through a 300-cycle interphase transformer, the necessary phase displacement is obtained for 12-phase operation at 2,400 kW. Main-line railway electrification equipment on order includes a 1,500-kW. rectifier for the Victorian Government Railways, Melbourne, and two 1,200-kW. mobile substations for the Netherlands Railways, bringing the total on this system to nearly 29,000 kW.

Delivery of forty 3,000-volt, 3,030-h.p. main-line locomotives for the South African Railways is in progress and some are now running on the Natal main line. The repeat order for nine motor coaches, four driving trailers, and one trailer coach for the Sociedade Estoril has been completed and the new equipment is now in service.

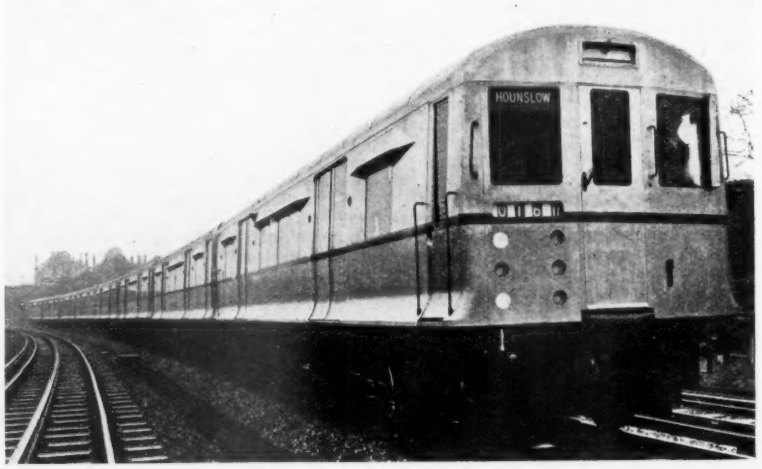
London Transport Lightweight Train

Eight-car set of light-alloy stock

A complete train of light-alloy rolling stock went into service on the District Line, London Transport, on January 19. Since last March, individual cars of light-metal construction have been running on that line; recent delivery of light-metal cars with driving-cab positions has now permitted the formation of a complete eight-car train.

London Transport has, in Great Britain, been the pioneer of aluminium alloy railway rolling stock, having three years ago placed a contract for 90 cars with the Metropolitan-Cammell Carriage & Wagon Co. Ltd., who collaborated with I.C.I. (Metals Division) and London Transport in their design. The construction of these vehicles was described in our May 4, 1951, issue. On the London Transport side, the development was largely due to the foresight and ingenuity of the late Mr. W. S. Graff-Baker, who was Chief Mechanical Engineer (Railways) of London Transport at the time. It is regrettable that his death (in February, 1952) occurred before the completion of this notable technical development which he had sponsored.

The cars are based on steel prototypes, being similar in all external aspects; they are also fitted with identical steel bogies



Train of unpainted light-alloy stock, London Transport Executive

and electric traction and auxiliary equipment. The new train weighs nearly 50 tons less than a comparable steel train, the individual cars weighing an average of 5¼ tons less than the steel cars, giving a saving of some 16 per cent. Weight-saving has always been recognised as being of supreme importance for services wherein the acceleration of the train from rest absorbs so high a proportion of the total energy consumed. The introduction of a complete train of light-alloy stock will allow direct comparison of energy consumption with that of a corresponding steel train.

A feature of particular interest about this train is that, following satisfactory experience during the past few months with a single unpainted aluminium car (see our June 20, 1952, issue), it has entered service unpainted externally except for a red band at waist level. Not only is economy effected in the initial and maintenance costs of painting, but experience to date is that the aluminium surface is more easily cleaned than the corresponding painted surface.

G.N.R.(I.) Fresh Meat for Export Traffic

A recent development on the Great Northern Railway (Ireland) has been the conveyance of fresh meat from Cavan, Dundalk and Monaghan to Dublin for shipment to Great Britain via North Wall—Holyhead. To carry this perishable traffic British Railways insulated containers are being used. The containers are carried on a G.N.R.(I.) flat-wagon and can be transferred from rail to steamer and road: they are completely insulated and although designed primarily for the transport of imported frozen meat they are now used extensively for fresh foods, such as meat, which has to be kept at low temperatures to prevent deterioration. The containers used for G.N.R.(I.) traffic are equipped with hooks for hanging meat carcases and some are fitted with roof bunkers for dry ice.

On most days since last July several wagon loads have been shipped daily from G.N.R.(I.) stations, and now it is usual to have a special train of 17 containers running into Dublin several days each week.

Besides the highly important feature of insulation, the use of the container gives a door-to-door service, as once the meat has been loaded by the sender in Cavan or Clones it is not handled again until it is received into the premises of the consignee in Great Britain. Great care is exercised in operating the traffic on both sides of the Channel, as outshipment and other delays must be avoided to ensure efficient speedy transport.

Staff & Labour Matters

Strike Threat Against Road Haulage Denationalisation

British Road Services employees were told at a meeting in London on January 18 that the proposed strike in protest at the Government proposal to denationalise road haulage would not now take place. Shop stewards explained that this was because of insufficient support, as it would only be possible to take industrial action when the workers in nationalised road transport were prepared to fight for what they had gained by nationalisation.

Measures proposed by speakers for further protest action included an immediate delegate conference of the T.G.W.U., a deputation to the House of Commons, and sending letters to M.Ps.

Railway Catering Pay Claim Rejected

The Hotels Executive on January 20 rejected a claim for a 10 per cent pay increase for its employees. The unions concerned, the N.U.R. and the T.S.S.A., are to consider their next step.

The claim was first made last year, at the same time as the claim for other railway workers, who were awarded an increase.

Contracts & Tenders

The Netherlands Railways have placed an order with the Société Générale de Constructions Electriques et Mécaniques (Alsthom), Paris, for 50 Bo-Bo twin-unit diesel-electric locomotives of 850 h.p.

The following further contracts have been placed by the Indian Government under its 1951-52, 1952-53 and 1953-54 programmes:—

Societe Anonyme des Forges Usines & Fonderies de et a Haine-Saint-Pierre, Belgium: Six "P" class locomotive boilers for the North Eastern Railway (1952-53 programme); 11 "P" class locomotive boilers (1953-54 programme); and four "YC" class locomotive boilers for the Southern Railway (1951-52 and 1952-53 programmes).

La Société Centrale des Chemins de Fer et d'Entreprises, Paris, has received a contract from the Turkish State Railways for twenty railcars and thirty trailers. The railcars are to be equipped with M.A.N. engines.

British Railways, Eastern Region, announces that the undermentioned contracts have been placed:—

George Simpson (London) Limited: Renewal of roof of locomotive shed and other repairs at Millhouse Motive Power Depot, Sheffield.

R. F. Herron Limited: Renewal of roof covering, Pasture Street Goods Shed, Grimsby.

Shirley Painting & Decorating Service: Cleaning and painting of Kings Cross Local, Suburban and York Road Stations.

A. Cameron Limited: Cleaning and painting Kings Cross Station, Eastern and Western office blocks, platforms 1-10, station buildings, circulating area and colonnade, cab rank and car road.

Fletcher & Company (Contractors) Limited: Renewal of floor, Grimesthorpe wagon repair shop, Sheffield.

J. Willmott & Sons (Hitchin) Limited: Construction of new lavatory accommodation, Doncaster Carriage Works.

Humber Graving Dock & Engineering Co. Ltd.: Repairs to floating pontoon and bearings of hinged bridges, New Holland.

S. Worboys Limited: Construction of station master's house (Contract No. 2), Potters Bar station.

R. Ridd & Son (Contractors) Limited: Cleaning and painting roofs, Kings Cross station.

British Insulated Callender's Construction Co. Ltd.: Supply and installation of signal and telegraph cables between Fenchurch Street and Bow Junction.

Kirk & Kirk Limited: Reconstruction of Parcels Office and Ladies' Waiting Room, Fenchurch Street Station.

The Office of the High Commissioner for Pakistan in London is inviting tenders for the supply of permanent way material. Details are given under Official Notices on page 111.

The United Kingdom Trade Commissioner at Delhi has notified the Board of Trade, Commercial Relations & Exports Department, of a call for tenders issued by the Directorate General of Supplies and Disposals, Government of India, for:—

240 chairs, cast-iron, for level crossings, special to connect 82 lb. and 90 lb. B.S. Rails, complete with distance blocks and bolts with washers, to specification.

130 chairs slide, cast-iron, deep, for 90 lb. R.B.S. Rails, overriding switch, to specification.

Tenders should reach the office of the Director-General of Supplies & Disposals, Government of India, Shahjahan Road, New Delhi, by 10 a.m. on Tuesday, February 2. A copy of the tender documents is available for inspection at the Board of Trade by representatives of interested United Kingdom manufacturers. A further copy is available on loan in order of written application. Reference CRE/2161/53 should be quoted.

The British Consul at Luanda has notified the Board of Trade, Commercial Relations & Exports Department, of a call for tenders by the Posts, Railway & Transport Services, Luanda Port & Railway Operating Board, for:—

24 water cranes (swivelling water-feeders for the supply of water to locomotives), as per specification.

Tenders should reach the Secretaria do Serviço de Compras e Armazens, Direccao de Exploracao do Porto e Caminho de Ferro de Luanda, Luanda, Portuguese West Africa, by 10 a.m. on Tuesday, March 31, 1953. A copy of the tender documents (in Portuguese) is available for inspection at the Board of Trade by representatives of United Kingdom manufacturers until February 7, after which it will be available on loan in order of written application. Reference CRE/1351/53 should be quoted.

The Special Register Information Service of the Board of Trade has reported a call for tenders notified by the United Kingdom Senior Trade Commissioner at Karachi, and issued by the Ministry of Communications (Railway Division), Government of Pakistan, for:—

2 metre-gauge diesel-hydraulic shunting locomotives of 350-400 h.p., strictly to specification, and adequate spare parts for the maintenance and repairs of the locomotives to give three years trouble-free working.

Tenders should reach the office of the Director-General, Railways, Railway Division, Ministry of Communications, Government of Pakistan, Karachi, by noon on Monday, March 2, 1953. A copy of the tender documents is available for inspection at the Commercial Relations & Exports Department by representatives of United Kingdom manufacturers until January 30, after which it will be available on loan in order of written application. Reference CRE/1640/53 should be quoted.

SCOTTISH STATIONS RENAMED.—The Scottish Region announces that Maryhill L.M.S., Maryhill L.N.E., and Neilston Passenger Stations have been renamed Maryhill Central, Maryhill Park, and Neilston Low respectively.

Notes and News

Turkish Electrification Proposal. — An agency message from Istanbul states that it is planned to electrify the Ankara-Istanbul and Ankara-Zonguldak lines.

Locomotive Assistants Required.—Applications are invited for two locomotive assistants, preferably single and between 26 and 30 years of age, required by the Central Railway of Peru. See Official Notices on page 111.

Bradford Exchange Station.—In describing the new gas lighting at Bradford Exchange in our January 9 issue, we incorrectly ascribed the station to the Eastern Region. Bradford Exchange Station is, in fact, in the North-Eastern Region.

Railway Operating Division Annual Reunion Dinner.—The annual Reunion Dinner of the Officers of the Railway Operating Division will be held on Friday, February 6, at the Transportation Club, 44, Wilton Crescent, London, S.W.1, at 6.30 p.m. for 7 p.m. Colonel Sir Michael Barrington-Ward will be in the chair.

Road Haulage Denationalisation.—A five-point programme to ensure success of the Government plan for denationalising road haulage was outlined by Mr. R. Morton Mitchell, Chief Executive Officer of the Road Haulage Association at the recent annual dinner of the R.H.A. Coventry Sub-Area at Kenilworth. Mr. Morton Mitchell said that sale of the nationalised assets should take place as quickly as possible, to minimise dislocation of traffic during the transition period. Secondly, reasonably attractive financial facilities must be made available to purchasers. Full scope must be given to workers to play their part in a revitalised road haulage industry. Fourthly, the functional organisation in the road haulage industry, through the medium of the R.H.A., would be increased to provide a complete service to trade and industry; permits should be granted wherever necessary to hauliers, from passing of the Act until abolition of the 25-mile limit late in 1954. Lastly, close liaison must be maintained between hauliers and the new British Transport Commission, to ensure that where appropriate the benefit of joint working would be available to all transport users.

More Eastern Region Locomotives to have A.T.C.—A further 48 Eastern Region locomotives of various classes are to be fitted with the recently-developed form of A.T.C. equipment described in our October 24, 1952, issue. With the six "A1" class locomotives already equipped, this will bring the total number of Eastern Region locomotives provided with the apparatus up to 54.

Record British Railways Coal Carryings.—British Railways carried the heaviest tonnage of deep-mined and open-cast coal since last April (3,336,930 tons) in the week ended 6 a.m. on January 19. The weekend figure (413,410 tons) was the highest since March. During the week ended January 10, 210,903 tons of iron and steel from the principal steelworks and 308,400 tons of iron ore were conveyed.

Safe Driving Awards to R.H.E. Drivers.—Major-General G. N. Russell, Chairman of the Road Haulage Executive, on January 19 presented Awards of the Royal Society for the Prevention of Accidents, for periods of from 25 to 31 years' safe driving, to 23 British Road Services drivers. In congratulating the drivers, he said that the Executive was giving constant attention, in conjunction with manufacturers, to technical improvements designed to increase safety and efficiency.

High Operating Cost of Road Passenger Services.—The Municipal Passenger Transport Association, the Passenger Vehicle Operators' Association, the Public Transport Association, and the Scottish Road Passenger Transport Association have asked the Chancellor of the Exchequer to receive a joint deputation to discuss a scheme whereby the bus industry would get a tax rebate on diesel fuel oil. A joint statement points out that removal of the tax on diesel fuel oil would probably in itself offer an almost complete solution to the present problem of increased fares and do much to stabilise the cost of living. Already in Britain there is a scheme allowing tax free fuel oil for marine and industrial purposes. Each time successive Chancellors have increased the tax in the last three Budgets, they have been clearly warned by the bus industry that the tax could only be met by increased fares, and each time the tax has had to be passed on to the travelling public.

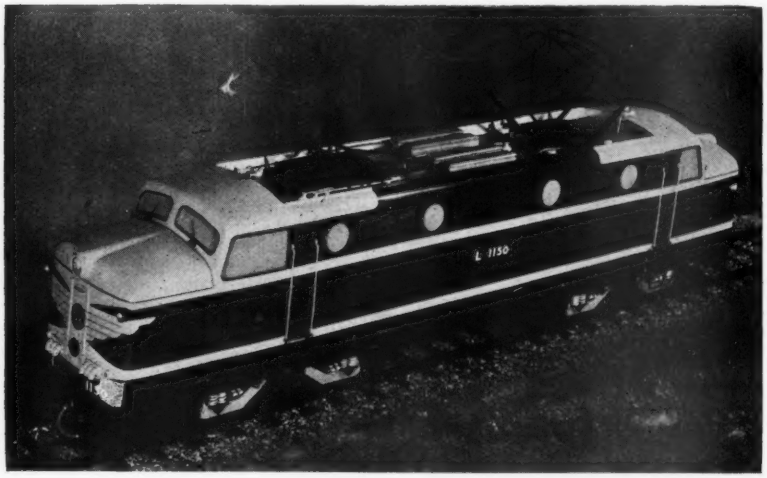
British Railways, Western Region, London Lecture & Debating Society.—A joint meeting of the British Railways, Western Region, London Lecture & Debating Society, and the Railway Students' Association, will be held on February 5, in the Headquarters Staff Dining Club, Bishop's Bridge Road, Paddington, W.1, at 5.45 p.m., when a debate will take place on "That there is a case for State subsidisation of British Railways."

Canadian Strike Threat.—The Brotherhood of Railroad Trainmen announced in Montreal last weekend that it told the Federal Labour Minister and both the Canadian National and Canadian Pacific Railways that its members would strike on February 2 if a satisfactory settlement was not reached before then of its claim for more pay and shorter hours. The brotherhood has 25,000 members. The strike threat was tempered by an offer to resume negotiations with the management of the railways. A spokesman for the Canadian National Railways said in Montreal that both railways would arrange a time and place for negotiations.

Road Accidents in 1952.—The provisional total of fatal road accidents in 1952 is 4,705, against 5,250 the preceding year. Ministry of Transport statistics show that the lowest number of road deaths in any one year before the war was 4,886, in 1926. Road deaths fell to 4,513 in 1948, when, however, petrol rationing was in force. The provisional figures for December bring the total number of road casualties for the year to 208,141—8,352 fewer than in 1951. During December, there were 476 road deaths, a decrease on the previous December of 45. An increase in the number of slightly injured persons may be attributed to accidents to vehicles during the prolonged fog.

Iron & Steel Bill: Position of Foundries.—The Minister of Supply, Mr. Duncan Sandys, on January 13 discussed the provisions of the Iron & Steel Bill with employers and trade associations of the industries affected, mainly as to the position of the foundries in relation to the Board to be set up under the Bill. Whilst the British Iron & Steel Federation, the Joint Iron Council, the Council of Iron Producers, and the Council of Ironfoundry Associations expressed approval of the inclusion of the foundries within the ambit of the new Board, the British Steel Founders' Association and representatives of the engineering industries maintained that the foundries should be excluded. Mr. Sandys said that the Government considered that if the Board was to obtain a comprehensive view of the needs of the industry it must embrace the foundries; this was particularly necessary in connection with raw materials. Whilst the Government adhered to its decision, he intended to introduce amendments to ensure that the Board's powers were limited to those strictly needed for performance of its duties and to avoid unnecessary encroachment into the engineering industry. After discussion the unanimous conclusion was reached that, short of exclud-

Victorian Government Railways Locomotive Model



Model by Cockade Limited, on a scale of half an inch to the foot, of one of the 25 main-line electric locomotives being built for the Victorian Government Railways by the English Electric Co. Ltd.

OFFICIAL NOTICES

The engagement of persons answering Situations Vacant advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 *inclusive or a woman aged* 18-59 *inclusive unless he or she, or the employment, is excepted from the provisions of the Notification of Vacancies Order,* 1952.

QUALIFIED locomotive draughtsmen required for Yorkshire Engine Company Limited, Meadow Hall Works, Sheffield 9. Staff appointment with pension. Application forms may be had by writing to the GENERAL MANAGER.

THE "PAGET" LOCOMOTIVE. Hitherto unpublished details of Sir Cecil Paget's heroic experiments. Eight single-acting cylinders with rotary valves. An application of the principles of the Willans central-valve engine to the steam locomotive. By James Clayton, M.B.E., M.I.Mech.E. Reprinted from *The Railway Gazette*, November 2, 1945. Price 2*s*. Post free 2*s*. 3*d*. *The Railway Gazette*, 33, Tothill Street, London, S.W.1.

BOUND VOLUMES.—We can arrange for readers' copies to be bound in full cloth at a charge of 25*s*. per volume, post free. Send your copies to the SUBSCRIPTION DEPARTMENT, Tothill Press Limited, 33, Tothill Street, London, S.W.1.

THE OFFICE OF THE HIGH COMMISSIONER FOR PAKISTAN IN LONDON invites tenders for the supply to the East Bengal Railway of 90 lb. rail Section Joint Insulations Four Channel Type Fittings. The tender No. PRR-3742/52 can be obtained from the office of the—HIGH COMMISSIONER FOR PAKISTAN IN LONDON (Room 115), 39, Lowndes Square, London, S.W.1, on payment of 5*s*. per set, which amount will not be refunded. Tenders will be opened at the above address on February 16, 1953.

REQUIRED by the Central Railway of Peru two Locomotive Assistants preferably single and between 26/30. Qualifications: Full apprenticeship with British Railways or Locomotive Builders and experience in one or more of the following: Railway Machine Tool Operation, Welding, Boiler work, Locomotive Running or Drawing Office. Apply—SECRETARY, PERUVIAN CORPORATION LTD., 144, Leadenhall Street, London, E.C.3.

TRANSPORT ADMINISTRATION IN TROPICAL DEPENDENCIES. By George V. O. Bulkeley, C.B.E., M.I.Mech.E. With chapters on Finance, Accounting and Statistical Methods. In collaboration with Ernest J. Smith, F.C.I.S., formerly Chief Accountant, Nigerian Government Railway. 190 pages Medium 8vo. Full cloth. Price 20*s*. By post 20*s*. 6*d*. *The Railway Gazette*, 33, Tothill Street, London, S.W.1.

THE OFFICE OF THE HIGH COMMISSIONER FOR PAKISTAN IN LONDON invites tenders for the supply to East Bengal Railway Medium Manganese Steel Rails B.S. 60R.FF Section and Fish Plates RPT's Type. The tender No. PRR.3585/52 can be obtained from the—OFFICE OF THE HIGH COMMISSIONER FOR PAKISTAN IN LONDON (Room 115) 39, Lowndes Square, London, S.W.1, on payment of 10*s*. per set, which sum will not be refunded. Tenders will be opened at the above address on February 16, 1953.

ASSISTANT TRANSPORT MANAGER required for Iron and Steel Works, North East District, age 35-40. Must have knowledge of Rail, Road, and Shipping Regulations. Railway experience essential. Apply giving qualifications and salary required.—Box 707, *The Railway Gazette*, 33, Tothill Street, London, S.W.1.

WANTED—1,000 tons relayable B.H. rails 95 lbs. B.S.S. Offers to—EAGRE CONSTRUCTION CO., LTD., East Common Lane, Scunthorpe.

N.E.R. HISTORY.—Twenty-Five Years of the North Eastern Railway, 1898-1922. By R. Bell, C.B.E., Assistant General Manager, N.E.R. and L.N.E.R. Companies, 1922-1943. Full cloth. Cr. 8vo. 87 pages. 10*s*. 6*d*.—*The Railway Gazette*, 33, Tothill Street, London, S.W.1.

ing the foundries from the Bill, the revised Government proposals would go far to remove objections.

British Railways, Southern Region Lecture & Debating Society.—The illustrated lecture on "Modern Railway Signalling," by Mr. L. J. Boucher, Signal & Telecommunications Engineer, Southern Region, given before the British Railways, Southern Region Lecture & Debating Society on October 30, 1952, is being repeated for the benefit of the British Railways, Eastern Region, Staff Railway Society, and will take place on January 28, at 6 p.m., in the Staff Dining Club at Kings Cross. An invitation to attend this lecture is extended to members of the Southern Region Lecture & Debating Society.

G.N.R.(I.) Acquisition.—Another conference took place in Belfast on January 16 on the legislation covering the acquisition of the Great Northern Railway. Those taking part were officials of the Northern Ireland and Republic of Ireland Governments, including representatives of the Ministries of Finance & Commerce, and the Departments of Industry & Commerce, and Finance, and Parliamentary draftsmen. No Ministers were present. The preparation of the Bill, which is to be introduced simultaneously in both Parliaments, is nearing completion. It provides for the purchase of the company in equal shares of £2,250,000 and for the establishment of a joint operating board.

B.T.C. Railway Mobile Civil Defence Training School.—In order to augment the British Transport Commission's Civil Defence training programme, the London Midland Region has converted at its Wolverton Carriage Works an old vehicle, no longer suitable for passenger traffic, for use as a mobile training school. Already Civil Defence schools have been held at Watford, York, Southampton, Glasgow, Perth, Birmingham, Cardiff, Edinburgh, Liverpool, and Sheffield; and schools at St. Pancras (London), Newcastle, Hull, Dundee, Swindon, and Brighton are now running. At the outset, the new mobile school will travel throughout the London Midland Region to motive power and engineering depots. Instruction will be given by a fully qualified Civil Defence instructor on the spot to breakdown and repair gangs. Later, the same method will be used to teach Civil Defence to staff in other parts of the Commission's undertaking throughout the country. The vehicle includes seating accommodation for classes of 25 students, who will each take a two-day course.

L.M.R. North Wales Stations Closing.—The London Midland Region announces that the section between Ruthin and Corwen, on the Denbigh-Corwen line, and also Llanrhaiadr Station, between Denbigh and Ruthin, will be closed for all traffic on and from February 2. Llanrhaiadr Station will be closed to all traffic, and Eyarth to passengers, parcels, and passenger train merchandise. Nantchwyd, Derwen, and Gnyddelwern will be closed to passengers; parcels and passenger train merchandise will be dealt with by road services. Bus services are available for passengers to all places on the line.

Objections to Passenger Charges Scheme.—A group of Conservative M.P.s has expressed its intention of raising in the House of Commons the question of the manner in which the Passenger Charges Scheme, 1953, has been lodged. The announcement in the *London Gazette* of January 9 states that objections to the Scheme must be lodged by February 2. The M.P.s, however, point out that there has been no publication of the section of the Transport Tribunal Order of January 5 which authorises application to the Tribunal for an "interlocutory relief"; this is interpreted as meaning that anyone with a reasonable objection may apply to have it lodged after February 2 and, in fact, right up to March 9, when the hearing before the Tribunal begins. The provisions of the Transport Act, 1947, as to the manner in which the Scheme must be dealt with, have been observed. In reply to a question in the House on January 20, Mr. Gurney Braithwaite, Parliamentary Secretary to the Ministry of Transport, said the Government intended no further action on passenger fares until the outcome of the hearing before the Tribunal.

Buffer Stop Collision at Washington.—The brakes of the Pennsylvania Railroad electrically-hauled "Federal Limited" from Boston failed as it was approaching Washington Union Station on January 15. The train collided with the buffer stop at over 50 m.p.h., and demolished the stationmaster's office and a bookstall; the engine and two leading vehicles fell through the concrete floor into a baggage hall on the lower level of the station 15 ft. below. Nobody was killed, but some 50 persons were reported to be injured, some seriously. Failure of the brakes was discovered some distance from Washington as the driver began to slow down, and the train crew had time to clear passengers from the leading vehicles and warn them to brace themselves for the shock. The train approached the Union Station with whistle blowing and bell ringing, and the stationmaster had time to clear his office and part of the station.

Crompton Parkinson Site Purchase in Canada.—A site of 27 acres outside Bantford, in Canada, has been purchased by Crompton Parkinson Limited for the purpose of building a factory. Plans for developing the site are not yet completed, but it is expected that the factory would be used for the manufacture or adaptation of electrical goods for the Canadian market.

High Costs and Taxation of Bus Undertakings.—Presiding at the annual general meeting on December 30 of the East Kent Road Car Co. Ltd., Mr. R. P. Beddow, the Chairman, emphasised in his address the heavy burden of costs and taxation. Under fuel tax and wages alone, he said, not less than £215,000 a year had been added to their costs in 1950 and 1951. In 1952 a further £102,000 a year had been added under the same headings. With others they had had to expect increases in wages and commodity costs in these days of inflation. In the same way their passengers must expect increased fares. What was unjustified was the increase in the fuel tax. Fuel oil and petrol were their main raw materials, and their business was a public utility; it was extraordinary that their main raw materials attracted a tax of 200 per cent — a far greater rate of tax than on cosmetics.

Vokes Limited.—Intensification of research and development work was referred to by Sir Ian Stewart-Richardson, Chairman of Vokes Limited, at the annual general meeting of the company recently. He said that the company's products were now used over a wider field of industry than ever before. He warned the meeting, however, that it was not unreasonable to foresee some decrease in the turnover as a result of the increasing competitive activity in the world engineering market.

Furthermore, the question of price had become increasingly important, especially in export markets, and not only might the percentage rate of profit tend to decline, but it would be very difficult to pass on to the customer any rise in the cost of production. Trading profits of the group for the year to June 30, 1952, were £201,927, and the final balance available of £116,816 compared with £85,725 in the preceding year. Subsidiary companies achieved a net profit, after taxation, of £2,569, compared with a loss of £7,835 for the year to June, 1951.

Forthcoming Meetings

January 24 (*Sat.*).—Institution of Mechanical Engineers, Graduates' Section London, at Storey's Gate, St. James's Park, S.W.1, at 3 p.m. Annual Lecture on "The Development of the Engineer in Practice," by Mr. R. A. Riddles, Member of Council.

January 26 (*Mon.*).—Timber Development Association Limited, in the Assembly Hall at the South-West Essex Technical College, Forest Road, Walthamstow, at 7.0 p.m. A United Nations film "Green Gold," to be followed at 7.30 p.m. by a Timber Brains Trust.

January 27 (*Tue.*).—Institution of Civil Engineers, at Great George Street, Westminster, S.W.1, at 5.30 p.m. Paper on "Design of Structures in Relation to Maintenance and Inspection," by Mr. F. Turton and Mr. N. S. Cox.

January 28 (*Wed.*).—Railway Students' Association, at the London School of Economics & Political Science, Houghton Street, Aldwych, W.C.2, at 6.15 p.m. Paper on "British Railways and the Coal Industry," by Mr. W. L. Kelly.

January 28 (*Wed.*).—Institute of Transport, Visual Aids Study Group, at 80, Portland Place, W.1, at 6.0 p.m. View and discussion of two films: "Train Time" and "In All Weathers."

January 28 (*Wed.*).—British Railways, Eastern Region, Staff Railway Society, at 6.0 p.m. in the Staff Dining Club at Kings Cross. Repeat illustrated lecture "Modern Railway Signalling," by Mr. L. J. Boucher.

January 29 (*Thu.*).—British Railways, Western Region, Lecture & Debating Society, in the Staff Dining Club, Bishop's Bridge Road, Paddington, W.1, at 5.45 p.m. Paper on "Steel Company of Wales: Developments at Port Talbot," by Mr. W. F. Cartwright.

January 31 (*Sat.*).—Permanent Way Institution, at the Railway Executive Headquarters, 222, Marylebone Road, N.W.1, at 5.45 p.m. for 6.15 p.m. Conversazione. Tickets 7s. 6d. each.

February 2 (*Mon.*).—Society of Engineers, in the Apartments of the Geological Society, Burlington House, W.1, at 5.30 p.m. Presidential Address.

February 2 (*Mon.*).—Institute of Transport, at 80, Portland Place, W.1, at 5.30 p.m. for 6 p.m. Symposium on British Railways—"Commercial," by Mr. A. E. Hammett, and "Operating," by Mr. S. W. Smart.

February 2 (*Mon.*).—Historical Model Railway Society, at the Headquarters of the Stephenson Locomotive Society, 32, Russell Road, W.14, at 7.0 p.m. Paper on "The Railway Cross-Channel Services," by Mr. C. Grasemann.

February 3 (*Tue.*).—Permanent Way Institutions, Leeds Section, at Leeds Church Institute, Albion Place, at 7.0 p.m. Paper on "Bridgework as it Affects the District Engineer and his Staff," by Mr. A. N. Butland.

February 4 (*Wed.*).—British Railways, Southern Region Lecture & Debating Society, in the Chapter House, St. Thomas' Street, S.E.1, at 5.45 p.m. for 6.0 p.m. "If you want to know . . . Ask a policeman," by Colonel N. McK. Jesper.

February 5 (*Thu.*).—Society of Chemical Industry, Nottingham Section, in the Gas Showrooms, Parliament Street, Nottingham, at 7.15 p.m. Paper on "The Effect of Climate and Atmospheric Pollution on Corrosion," by Mr. J. C. Hudson and Mr. J. F. Stanners.

February 5 (*Thu.*).—British Railways, Western Region, London Lecture & Debating Society, in the Headquarters Staff Dining Club, Bishop's Bridge Road, Paddington, W.1, at 5.45 p.m. "That there is a case for State Subsidisation of British Railways," a debate with the Railway Students' Association.

February 5 (*Thu.*).—Railway Students' Association, in the Headquarters Staff Dining Club, Bishop's Bridge Road, Paddington, W.1, at 5.45 p.m. Debate with the Western Region London Lecture & Debating Society on "That there is a case for the State Subsidisation of British Railways."

February 5 (*Thu.*).—Electric Railway Society, at the Fred Tallant Hall, 153, Drummond Street, N.W.1, at 7.15 p.m. Paper on "The Swiss Federal Railways," by Mr. C. Smith.

Railway Stock Market

Various factors have contributed to rather more active markets and an upward trend of values in British Funds and industrial shares. Foreign rails were quiet in comparison, though somewhat more active with the general trend of markets. The buying of British Funds has reflected continued hopes of a reduction in taxation this year. The main activity in industrials has been in shares influenced by rumoured takeover or merger developments.

There has been investment buying as well, partly on higher dividend hopes in some instances, and partly because of the growing assumption that numerous shares are undervalued bearing in mind that assets appear in the accounts at much below their current replacement values. If taxation is lowered in the next Budget, it will make for higher prices and lower yields for all classes of investments, including ordinary or equity shares besides British Funds and other fixed-interest securities. The recent increase in the National Provincial Bank dividend, followed by some higher payments from industrial companies, has helped sentiment, because it has given rise to the assumption that others may follow a policy of paying rather less conservative dividends than in the past. The profits of industrial companies are now showing much more variation and may fluctuate rather more than in recent years, it is argued, so that shareholders should be entitled to higher dividends in a good year.

A feature has been renewed buying of White Pass & Yukon common shares, the recent fall attracting buyers. At the time of going to press, the price has moved up to $18⅜ and the convertible debentures to £69.

Canadian Pacifics at $57½ have not held best levels, sentiment being affected by the higher wages claim and strike threat, but the 4 per cent preference stock held steady at £63½ and the 4 per cent debentures were £78½. In contrast there was further selling of United of Havana stocks by speculators tired of waiting for news of take-over developments from Cuba. The 4 per cent "A" stock receded to 64, the "B" stock to 57, and the second income stock to 17, while the consolidated stock was 2¾.

Manila Railway debentures were active again, but inclined to lose ground on the fear that it may take some while before the Railroad company sells property assets so as to deal with the arrears on the bonds held by the Railway company. Nevertheless, the market remains confident that a settlement will come along, though it may be some months before there are definite developments. Manila "A" debentures were 80, the "B" debentures 71 and the preference shares eased to 8s. 9d. while the 1s. ordinary shares changed hands around 3s. 6d.

Mexican Central "A" debentures moved up to 68. San Paulo 6s. 8d. units firmed up to 7s. 6d., but eased later to 7s. 6d. There was a little selling of Antofagasta ordinary stock, which receded to 10¼, while the preference stock was 51. Taltal shares firmed up to 15s. 6d. and Nitrate Rails shares were 20s. 6d.

Costa Rica ordinary stock continued to attract attention and changed hands around 9¾. Guayaquil & Quito 5 per cent bonds marked 36. Brazil Rail bonds changed hands at 6¼, Corboba "B" debentures around 46½, and Dorada ordinary stock up to 58. Business around 71½ took place in Nyasaland Railway 3½ per cent debentures at 71½.

Road transport shares were firm, with West Riding marked up sharply to 37s. while Northern General changed hands around 69s. 6d. after news of the proposed 150 per cent share bonus. Southdown were 29s. 6d. and Lancashire Transport 41s., while B.E.T. deferred stock, after easing, strengthened to £445.

The prospect of bigger steel supplies attracted attention to engineering shares, among which Vickers were prominent with a fresh rise to 47s. 1½d. Babcock & Wilcox were good at 71s. 9d., and John Brown firmer at 44s. 9d.

Guest Keen were 50s. 6d. George Cohen 5s. shares were 23s. 1½d., Metal Industries moved up to 42s., Neepsend were 27s., and Ruston & Hornsby rose further to 40s. 9d. Tube Investments displayed firmness at 61s., Cammell Laird 5s. shares were 11s. 3d., Thornycroft 48s. 9d. and T. W. Ward 72s. 3d., but British Aluminium came back to 41s. 6d. after their recent rise. Ransome & Marles were 24s. 3d. and Renold & Coventry Chain 38s.

Beyer Peacock were good again, with a further rise to 34s. 6d. and Central Wagon active around 59s. 9d. Vulcan Foundry were 22s. 6d., Gloucester Wagon 10s. shares 12s. and North British Locomotive 14s. 1½d. Wagon Repairs 5s. shares were 12s. 9d. and Charles Roberts 5s. shares 20s. 4½d. Birmingham Carriage were 32s. 9d. and Hurst Nelson 43s. 6d.